INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

VOL. 29 DECEMBER, 1940 No. 10

The Annual Index

This issue closes Volume 29 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. To relieve the readers of the trouble of writing the publisher for an annual Index, this has again been made a part of the December issue. It has been placed at the center so that it may be removed easily for binding the monthly issues for future reference.

Please Note

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION welcomes news notes for its Personal News, Association News, and News Notes columns.

Information of this nature can only reach the public if someone takes the trouble of sending it in. Will each reader appoint himself a committee of one to see that his co-workers in the United States are kept informed?

San Francisco Is Calling You

Read what George G. Mullany has to say about San Francisco and its schools, also what Homer J. Smith, vice-president of the Industrial Arts Education Section of the A.V.A., has written in his article entitled, "Some Facts about State Vocational Associations." Scan over the A.V.A. program on page 24A; then decide to attend the convention and lay your plans accordingly.

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Short Talks on Wood

WESTERN HEMLOCK (*Tsuga heterophylla*)

One of the most valuable trees of the Pacific slope. Not to be confused with its eastern relative *Tsuga canadensis*. The wood is tough, durable, hard, light and strong. Easily worked. Brown in color.

This wood is not used as advantageously as it should be, but its good qualities are beginning to be appreciated by architects and builders. It is now used in increasing quantities for building purposes and pulp wood. Because is reproduces easily on cutover lands it makes an excellent repeat crop for paper company forest lands. Bark is used for tanning leather.

Found in abundance in the coast region of southern Alaska, British Columbia, Washington and Oregon. Grows best where there is a plentiful water supply. Very tolerant of shade. Long lived. Its common associates in the forest are western red cedar, Sitka spruce and Douglas fir.

Rather slow growing. Mature trees average about 150 feet in height and 3 to 4 feet in diameter. Broadly pyramidal. One of the most beautiful of western conifers. Noted for its fine lacey foliage and drooping branches.

The bark is thick, dark, russet-brown, and is deeply furrowed. The leaves (needles) are flat, have rounded ends and are 1/4" to 1" long. Spirally arranged around the twigs. Bluish green with white lines on both sides. The cones are abundant, pendulous, 3/4" to 1 1/4" long. Seed is small with a comparatively large wing.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

San Francisco and the A.V.A. Convention

GEORGE G. MULLANY

Director of Publications,
Public Schools,
San Francisco, California

A young reporter recently assigned to write a series of stories for a daily newspaper under the general title "If I Were Twenty-One" returned from one of his interviews to report that the subject, a successful businessman of 55 years, said if he had the years to live over again he would not have his career changed in the slightest.

Another newspaperman, Mr. Richard Donovan, recently asked the question in the San Francisco Chronicle, "What changes should be made in American education to conform with the changing standards of a mechanized war-torn world?"

Much to his amazement he found that the rank and file of American parents answered in the way as did the businessman just mentioned.

"Those youths who are mechanically inclined should be encouraged in every possible way to develop their talents" wrote one parent. "But they should not be exempt from some standard of classical training. The 1940 mechanic must have a well-oiled head as well as oily hands."

This trend of parent opinion seems to have other sources of supporting opinion, translating into terms of actual demand the thought of parents. Recently a professional man of high standing asked and had his son transferred from a modern junior high school to a classical senior high school, without shops or commercial classes.

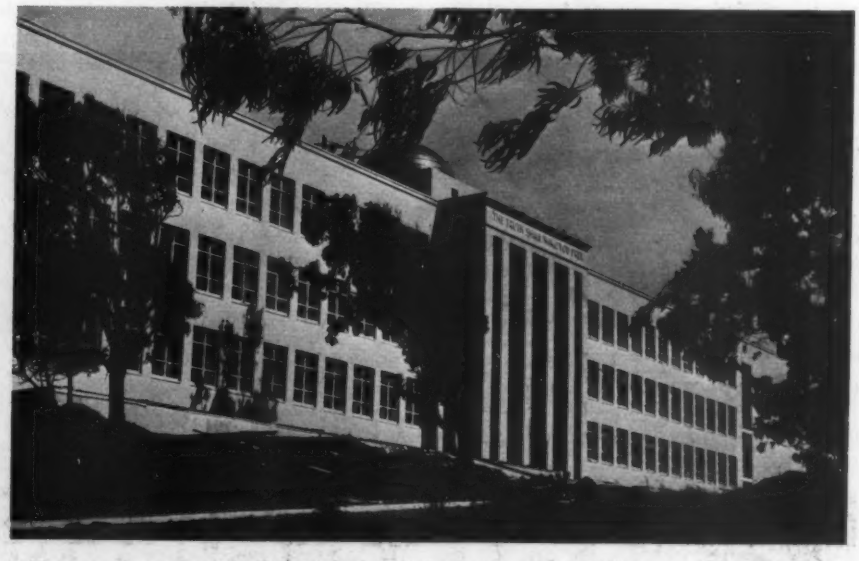
This successful father who wished his son transferred, was the product of the old school, attributed his own success to what he had learned there, and wished to give his boy the identical advantage. He was unwilling to have his son vary from the mold in which the father was cast. This attitude is not an isolated one. California's oldest high school, Lowell of San Francisco, is strictly academic in its curriculum in this sense, that it has no shops for the teaching of mechanical arts, no classes in commercial subjects, and until recently possessed no gymnasium for the teaching of physical education. It is in a comparatively old building, compared with surrounding modern high schools, yet it is the only San Francisco High School which is overcrowded, to which parents will go to any considerable trouble to enroll their own son or daughter.

Are parents making a mistake by trying to direct the education of their children exactly as they themselves were educated? Are the educators themselves responsible for this attitude because of the so-called failures of modern education — those pupils who are unable to spell as well as others after 12 years of classroom instruction?

Twenty years ago a child of that day remained in school until the lessons offered went beyond his capacity to absorb and understand. Then he lost interest and obtained a job in the workaday world. Brighter members of his class remained in school and they were the products by which public education of that day was judged.

Passage of a compulsory education law, amended in 1929, changed all this. The new law imposes upon educators the responsibility for keeping children in school until they attain their eighteenth year or are graduated from high school. The change catapulted into the hands of educators a custodial problem of what to do with that group of children who were not adapted to formal academic education but who must be kept in school to meet the requirements of law.

The staggering proportion of this problem, is indicated by the statistical fact that as recently as the year 1920 only 7 per cent of the public school students completed high school. Ten years later in 1930, 29 per cent of all those who started completed the twelfth grade, and just last year 86 per cent of all starters stayed to earn a high school diploma.



San Francisco Jr. College, San Francisco, Calif.

The increase in the holding power of the school in 20 years is 79 per cent. Of the total number of children involved, 30 per cent go on to college and 70 per cent seek a job in the workaday world. It is for the 70 per cent that vocational education, preapprentice training, and the apprentice training programs of the public schools today are directed.

William S. Knudsen, president of General Motors, recently referred to the fact that America, during its pioneer and immigrant days, had acquired great reverence for book learning. He expressed the opinion that a person educated entirely through books is only half educated and that the training of the hand is an excellent method of training the brain. He also pointed out that George Washington had followed the strenuous life of a surveyor, that Thomas Jefferson had been a designer of useful appliances, and that Benjamin Franklin was a printer, an inventor, and a scientist.

Facilities for industrial arts and vocational education have been installed in junior and senior high schools throughout California for the past 20 years. Trade schools have been erected and are operating in all the large cities. What the program needs to push it forward is the encouragement of all parents and educators.

William B. Brown, director of curriculum of the Los Angeles Public Schools, recently told the California School Supervisors, in session at Pasadena, that "we need more of the practical type of study, less of the academic college preparatory, and more training for industry and life." Mr. Brown's message is that of the trained educator who sees the need, speaking to the parents of California who are not quite sold on the need he sees as real and immediate. Until the parents demand more of this work in the schools, the schools' hands are tied, with one possible alternative. Why not make industrial-arts work as compulsory as physical education or English? Why not attempt to teach each child one art or craft well, beginning in the junior high school and following through consistently until the twelfth year? What he starts in the seventh he must finish in the twelfth year. Under this system educators would be compelled to forego that delightful period of "permitting the child to make his own selection" — a time in which he dallies from one thing to another and masters none.

When the members of the American Vocational Association arrive in San Francisco, to attend their convention, December 16, 17, and 18, they will find a city with eight of its nine senior high schools fully equipped with shops and machinery involved in an industrial arts and vocational program. The machinery in the case of Girls High School is a model home built right into the school. There the young women practice the art of homemaking when they are not engaged in the learning of stenography, the dramatic or graphic arts, or other parts of the school program. In addition there is a modern new trades school, the Samuel Gompers, modeled after the Wiggins Trade School in Los Angeles, and a Downtown Business school, just starting, modeled after the Merritt School of Business in Oakland.

The new Samuel Gompers Trades School teaches young men and women to become proficient in a large number of trades. It provides a source for new apprentices in any given trade, thus making it possible for home-town boys to work into the trade of their choice.

Then there is the recently opened San Francisco Junior College which offers two-year academic courses leading toward entrance into the upper divisions of the universities, and two-year terminal courses leading toward immediate employment in industry.

The annual convention of the American Vocational Association will find the state and nation in the throes of an unprecedented program of industrial and vocational training.

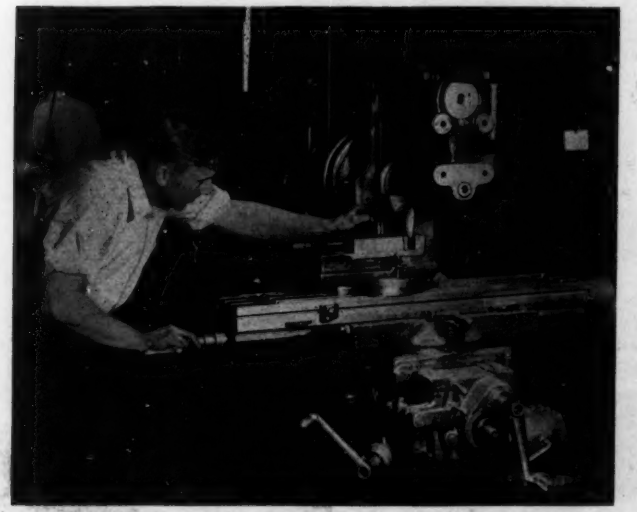
The impetus has come because of the passage of the National Defense Program for Workers, a federal measure by which $17,000,000 has been appropriated to the state school systems for the training and retraining of craftsmen in trades in which they will be required because of aircraft and ship construction authorized under the National Defense Program.

Number one man of the program in California is John C. Beswick, chief of the Bureau of Trade and Industrial Education of the California State Department of Education, long a national figure in this field. At present Mr. Beswick is busy directing a far flung organization in 58 California counties. To cope with this unusual situation Mr. Beswick has a long experience which saw him direct a similar program through one war back in 1917.

Already the California State Board of Education has authorized installation of courses under the National Defense Act, but that is only the beginning. This newest infant which has been dumped into the laps of schoolmen threatens to grow whiskers and pick up headaches overnight. For it requires special treatment, special appropriations, special care, and above all it must *not* be confused or merged with the apprentice training, preapprentice or trade extension courses. It is a thing apart to be run on a separate fast educational track.

Upon one point, however, all persons interested in the program are agreed: The courses offered under the National Defense Program for Workers are shorter in duration than apprentice courses. If they can be compared with the present program at all, it would be in the field of trade extension — where a recognized journeyman in one trade wishes to improve his skill in a related trade or undergo training to meet changing conditions.

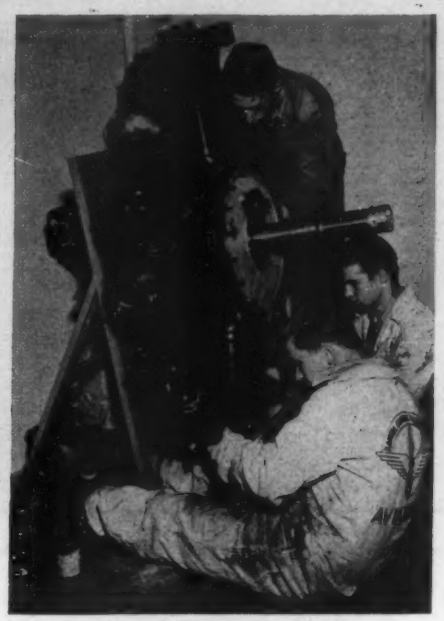
A definite need is known to exist in the ship-fitting trades of San Francisco for additional men and around this demand the first courses are being built. To begin, the offerings will be calculated to improve the skills of men already identified with the trade who must be retrained in certain specialist phases of shipbuilding before they can be as useful as the average jour-



A young mechanic at work in the Samuel Gompers Trades School

Radio repair, Samuel Gompers Trades School

San Francisco operates five adult vocational centers in arts and crafts



Aeronautics, Samuel Gompers Trades School

Advertising design, Samuel Gompers Trades School

neyman. One example is in training machinists to read blueprints. Once the supply within the craft has been filled, others will be sought to fill the demands. Working in the central California area to facilitate operation of needed courses to aid in shipbuilding and aircraft production is John P. Gifford, assistant to Mr. Beswick. His first task has been to uncover craftsmen who need some special training in order to qualify for changing trade conditions in the industry which demands more men, and to be certain that the demand will be genuine and sustained.

The new Samuel Gompers Trades School in San Francisco is ideally suited to assist in the realization of this program, and operates morning, afternoon, and evening, according to Joseph P. Nourse, superintendent of public schools.

The morning sessions are given over to mechanical engineering classes under the jurisdiction of the San Francisco Junior College, the afternoon sessions for preapprentice training for students of high school age, and the adult evening sessions are for employed or recognized apprentices in 15 crafts; employed or recognized journeymen in trade extension courses and radio, aeronautics and advertising design courses to which students may be admitted without conditions or restrictions.

Several new courses are included in the curriculum of all three trades divisions: preapprentice, trade extension, and apprentice courses. The new subjects are mill and cabinetwork, machinists and auto mechanics. In addition, courses for glassworkers and carpet, linoleum, and soft tile workers will be offered in the evening apprentice division.

The courses offered by divisions are as follows:

1. *Preapprentice day classes for students of high school age:*

Radio, electricity, aeronautics (fuselage construction), radio broadcasting, Diesel engines, advertising design, mechanical drafting, tool and die, aeronautics (ground school), electric welding, auto mechanics, gas welding, machinist, mill cabinet.

2. *Evening classes for adults, open to all without special restrictions:*

Radio, aeronautics (fuselage construction), advertising design, radio broadcasting, aeronautics (ground school).

3. *Evening trade extension classes for employed workers (for journeymen tradesmen who are desirous of extending their skills into related fields):*

Electric welding, gas welding, radio, heat transfer, metallurgy, fuels and lubricants, tool and die, electricity, mill cabinet, machinist, auto mechanics.

4. *Evening apprentice training classes (open to recognized apprentices in the crafts listed):*

Carpentry, electricity, hardwood floor laying, lathing, mill and cabinet, ornamental ironwork, painting and decorating, plastering, plumbing, sheet-metal work, steam fitting, machinist, glassworkers, carpet, linoleum, and soft tile workers, auto mechanics.

Some Facts About State Vocational Associations*

HOMER J. SMITH

Professor of Industrial Education, University of Minnesota, Minneapolis, Minnesota

In November, 1939, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION contained an article by the present writer entitled, "Industrial Arts in A.V.A. Programs." That article reported a canvass of annual-convention-program bulletins since 1926, when the organization in question began to function under the current name. The study set forth the general nature of the annual programs which had averaged more than 200 participants, without reference to breakfast, luncheon, and dinner meetings. It reviewed, also, the numerous and varied convention activities other than scheduled lecture and conference sessions. Mention was made of broad classifications of the membership as reflected in specific divisions, affiliated societies, fields, and subjects. Particularly, and in detail, that article covered the provisions made within the industrial-arts area by reason of the writer's A.V.A. relationship with that area.

It is the purpose of this writing to cover some aspects of the organization of *state* vocational groups which are the core and

*A second article by Professor Smith in his capacity of vice-president of the A.V.A., representing Industrial Arts Education.

States	1-2	A	B	C	D	E	F	G	H	I	J	K
Alabama	1				no						no	
Arizona	2	x	x	x	?	x	x	x	x		no	
Arkansas	2	x		x		x					no	Kan. Arts Soc. of Ark. Ed.Assn.
California	1	x			x						Div.	
Colorado	2	x	x	x		x					yes	Organized labor
Connecticut	2	x				x			x		no	
Delaware	2	x	x	x	x	x		x			Div.	
Florida	2	x	x	x	x	x			x		Div.	
Georgia	2	x	x	x	x	x			x		Div.	
Idaho	2	x		x		x			x		no	
Illinois	2	x	x	x	x					Illinois Art Association	Div.	
Indiana	2	x	x	x	x	x					Div.	Ind. Industrial Assn.
Iowa	2	x		x	x	x					Div.	
Kansas	2	x		x	x						Div.	
Kentucky	2	x	x	x		x		x			no	
Louisiana	1				yes						Div.	
Maine												
Maryland	2	x	x	x	x	x	x	x	x		Div.	
Massachusetts	2	x	x	x		x			x		no	
Michigan	2	x		x	x	x	x		x		Div.	Mich.Indus. Educ.Society
Minnesota	2	x		x	x	x		x	x	Coordinator's Association	Div.	
Mississippi	1				no						no	
Missouri	2	x	x	x	x	x					Drv.	
Montana												
Nebraska	2	x	x	x		x					no	
Nevada	2	x		x	?	x	x		x		?	
New Hampshire	2				x	x					Div.	N.H.Industrial Arts Assn.
New Jersey	2			x	x	x	x	x		Fine Arts Association	Div.	Voc. and Art Assn.
New Mexico	2	x	x	x	?	x					no	
New York	2	x	x	x	x	x	x	x		Adult Educ.--Tchr.Training Institutional Tr.	Div.	
North Carolina	2	x	x	x	x	x	x	x	x		Div.	
North Dakota	1	x	?	x	x			x			Div.	
Ohio	2	x		x		x					no	
Oklahoma	2	x		x	x	x			x	Coordinators Supervisors Teacher Trainers	no	Indus.Educ. Div. Okla.Educ. Assn.
Oregon	2	x		x	x	x			x		Div.	
Pennsylvania	2	x		x	x	x					Div.	
Rhode Island	2	x			x					Trade Schools	Div.	
South Carolina	1				yes						Div.	
South Dakota	1				yes						Div.	
Tennessee	1				no						no	
Texas	2	x	x	x	x	x		x	x		Div.	
Utah	2	x	x	x	x	x					Div.	
Vermont	1				yes						Div.	
Virginia	2	x	x	x	x	x	?	?	?		Div.	
Washington	2				x	x			x		Div.	
West Virginia												
Wisconsin	2	x	x	x		x			x	Directors-Coord. Gen.Subjs.-Tchr. Training	no	
Wyoming	2	x		x		x	x		x		no	
Alaska												
Hawaii	1										no	
Puerto Rico	2	x	x	x		x		x	x		no	Insular Home for Boys

Table showing divisions and affiliations (State Vocational Associations)

Key:
1-2—President or supervisor or both responding.
A—A gricultural education.
B—Business education (also commercial or distributive).
C—Home economics education.
D—Industrial arts education.
E—Industrial education (trade and industry).
F—Part-time schools.
G—Vocational guidance.
H—Vocational rehabilitation.
I—Other regularly constituted divisions.
J—Industrial arts groups affiliated with state and with A.V.A.
K—Other societies affiliated or associated with state.
?—Ambiguity in, or conflict between two state reports.

bulk of the *national* body with its representative officers, delegates, and committees. Here again, and for the same reason, special attention is accorded the industrial-arts personnel. As of August 31, 1940, there is a total paid membership of nearly 24,000 men and women in the American Vocational Association, Inc., with every state contributing. Indeed, every state has a society affiliated or in very close association and sympathy. It is these state groups with which we are here concerned.

The only available survey affording comparisons on similar points is one issued last January by Mr. William A. Brazier of the Milwaukee School of Vocational and Adult Education. Mr. Brazier, serving as chairman of a nation-wide "Committee on Activities of State Associations," used the questionnaire process to prepare *A Report Given at the Annual Meeting of State Officers at Grand Rapids, 1939* (eight pages, mimeographed). Among 20 major items he provided data concerning names, affiliations, and relationships of state groups which subjects are to be considered here also.

Two sets of questions were employed in gathering the materials presented following, and the project was made possible by the financial cooperation of Mr. L. H. Dennis, executive secretary, and the executive committee of the A.V.A. Two three-page forms, similar in most respects, were sent to *presidents* of state vocational associations and to *state supervisors* of trade and industrial education respectively. It is assumed that these two officials, in each of the states, are best prepared to furnish the desired information. Two persons were universally approached because the one official has a comparatively long-time touch with the state association and because two replies from a state would check and complement each other. This plan seemed to assure more simplicity and correctness for the study. That the two-man plan was justified is evidenced by the fact that some points are still in question. Nor does this circumstance argue that additional correspondents would have provided real clearness. Despite prompt and careful cooperation, and these are hereby gratefully acknowledged, one must conclude that more state organizational work needs to be done and that patterns effected need to be more definitely publicized. No formal constitutions of societies were solicited, and the few at hand were not used. This canvass was based wholly upon brief, somewhat objective and rather similar forms, received singly or in pairs by states, together with explanatory and supporting letters.

Names of Societies

Thirty-three states of those shown in our chart to be reporting, use the brief and identical name typified by "Minnesota Vocational Association." Others use modifications of this form; namely, Arizona State Vocational Association, New York State Vocational Association, Connecticut Section of the A.V.A., Michigan Society of Vocational Education, and Wisconsin Association for Vocational and Adult Education. We note the Wyoming Agricultural Association and the California Agricultural Teachers Association. There are the Washington State Industrial Education Association, the New Hampshire Society for Industrial Arts and Vocational Education, and the Industrial Education Division of the Oklahoma Education Association. Three states of the first-mentioned 33 seem to have, additionally and respectively, the Indiana Industrial Association, the New Jersey Vocational and Arts Association, and the Industrial Education Association of Utah.

Basic Divisions

Reference should now be made to the chart with its extended key. An *X* in any frame means the presence of the division in question in the state organization—this to the extent that the writer was able to interpret the situation from one or both responses. Where frames for a state are completely open it is meant that neither blank had returned when tabulation had to be closed. Question marks indicate conflict or ambiguity in the returns.

The Columns *A* through *H* represent the eight current divisions of the A.V.A. It will be noted that, in general, the state associations tend to follow the pattern of the national group. If these eight A.V.A. divisions might be assumed to continue through a series of years it would seem appropriate to urge that state groups go even further in the matter of conformity. Such action would have several justifications, not the least of them being easier accounting. States with groups of unusual nature could add divisions to the standard set. If, on the other hand, changes in the national constitution, bylaws, or policies are likely in the near future to modify the nature of field representation in the A.V.A., then the state associations may well await these changes. It is conceivable that, if all of us were to become active together, we might perfect the organization of both.

Reference to Column I shows us that some state associations now have organized divisions additional to the basic eight. This indicates, for these states, the presence of newer groups strongly organized and

conscious of their identities. Perhaps the months and years ahead will bring us higher frequencies for some of these variant classifications. They are suggestive and one thinks at once of CCC — NYA — and other possibilities. Of course, we could go too far in extension of major divisions. We could run a breakdown by services and sections and types to the point of harm. Yet we do now have rather large numbers of members in some states who are without representation and without correct listing. We have the responsibility to give careful consideration to our major divisions as the years pass, because we now face or may face a real problem in this regard.

Affiliations

This section of our report cannot be satisfying because it must continually "beg the question." The term *affiliation* was given, at least, a double connotation. Some of our correspondents were thinking in terms of the definite and formal connection of a nondivisional group with a state vocational association and, therefore, with the A.V.A. Others were thinking in terms of loose association of groups or of individuals representative of fields not named as major divisions.

Dozens of statements like the following cited relationships and problems but they did not provide a really numerical picture. Perhaps it is just as well. What people are thinking is perhaps more helpful to know than what patterns they have already established.

"We welcome groups of all kinds whatsoever."

"We have no organization by divisions and no affiliations based on services."

"We send other classifications to Mr. Dennis but we have no such sections."

"A.V.A. membership is optional."

"We solicit only federally aided persons and few others join."

"Our state association is more a holding company. It is representative of all groups but holds only executive meetings."

"The situation here is different than in most states. We have a paper organization for the sole purpose of affiliating with the A.V.A. There is another organization which includes many divisions and which is doing a fine job."

"We are concerned in our state entirely with the group who are not attending regular full-time school. This makes our organization different."

"There is an industrial arts association that includes all vocational T and I teachers also and acts as a clearing house for agriculture and home economics. We hope to combine all groups."

"We are having difficulty in getting unified action, but are making progress."

The crux of the matter is that some state organizations have certain formal divisions and all who join are credited to these. Others have divisions and affiliated societies. Still others recognize the existence of field or subject groups and are attempting to find some satisfying means of bringing all interested people into a functioning whole. We must add to these facts the additional ones of regional clubs within some states and of larger and well-known associations of related type that ignore state lines or include specified states or areas. All this confusion, if such it be, is indicative of action and growth. It is at the same time distasteful and heartening. Other fields of education are similarly muddled — guidance and personnel for example, and rehabilitation, and adult education, etc. Likewise professions other than education have their organizational problems. It would seem that we should try first for a *divisional* plan, then for *affiliation of groups* with representation until such time as new divisions seem practicable. To go beyond these two may be unwise.

Industrial Arts

Here we have a special problem because this phase or field of schoolwork is old, well established, and on the upgrade. Here we have a very large number of teachers, supervisors, and teacher trainers — scattered thoroughly in all states, generally well prepared, capable, and active. Given proper encouragement, they can become most professionally minded and helpful among us. Their acceptance and place in the A.V.A. has improved through a dozen years. In some state organizations, however, there are situations that are hazy and questionable. This has been unhealthy for all by reason of lack of understanding and cooperation. The present section of this paper seeks to describe the situation, rather than to place praise or blame. There are good spots and bad spots, if we may assume that industrial-arts men will profit, and that other divisions will profit with them, if we grow to our tasks together.

In the A.V.A., industrial arts is one of the eight major divisions, with a vice-president, two constitutional committees, places on appropriate special committees, as well as a representative on the editorial board and on the central research committee. This group has prepared and revised, and is now again revising, the most popular publication ever sponsored by the A.V.A. Reference is made here to the *Standards of Attainment in Industrial Arts Teaching*, all editions of which have reached a sales total of 15,000 copies. Each annual convention provides five industrial-arts programs. As reported in the article earlier referred to, 137 persons had spoken one to five times and 15 other persons had spoken six to 12 times, on industrial-arts topics, from 1926 to the Grand Rapids convention of 1939. The Grand Rapids program and attendance were both excellent in this division and the San Francisco plans would suggest that another peak is at hand. The industrial-arts division produces approximately one twelfth of the total A.V.A. membership, despite the fact that a large number of members who work in this field are otherwise classified. In brief, industrial arts is doing well under the A.V.A. — as to growth, participation, respect, the goodness of programs, and the loyalty of field leaders.

Column *J* of our chart answers questions as to the extent to which industrial arts is a regularly affiliated group, when it is not a major division of a state organization. It has been difficult to prepare this column because of indistinct responses and because of the dual use of the term affiliation. It is near the truth to say that, either as a division or as an affiliated group, industrial arts is fairly well adjusted to state, and A.V.A. membership in slightly more than one half of the states. The necessity for organizational work in this realm is clearly indicated.

We sample here the many notes provided by correspondents to show how industrial-arts people become A.V.A. members in states where the assumed routes are uncertain or blocked.

"They do not join the A.V.A." (several)

"They are counted in the trade and industrial section." (several)

"Anyone interested in vocational education may join us as individuals and, thereby, A.V.A." (several)

"May join but would be without representation."

"They join the A.V.A. directly without reference to us."

"Round tables affiliate with Industrial Education Association at 65 cents, then with state at 35 cents, then with national at one dollar — total fee two dollars."

"Members of our association but pay no dues and have no vote."

"They come to us through individual or group membership."

"They may join in the same manner as those working under the State Plan for Vocational Education."

"I do not know. I doubt if many are members of the A.V.A."

"All are members of the state association and the A.V.A."

"If they teach part-time or evening classes we admit them."

"While they are a field or division they do not have their own officers."

"They may join by contacting the state supervisor."

Sample Attitudes

We offer, also, many notes showing attitudes concerning industrial-arts connections with state associations and with the national. Readers will please recall that responses are from *presidents* of state associations and from *state supervisors* of trade and industrial education. Although the writer knows, with some clearness, the feelings of industrial-arts men over a wide area, this report must be limited strictly to the special materials of this project.

"They should be with us but a small number pay dues."

"We circularize every industrial teacher in the state but few industrial-arts teachers respond."

"Many belong, probably will become a regular division soon."

"Our state is dual. To include industrial arts would penetrate into only a small belt of the other system."

"No state supervision of industrial arts. The crux of the whole trouble." (several)

"I don't believe A.V.A. should include industrial-arts teachers. No Smith-Hughes funds so expended. If included, English, mathematics, and science would be eligible."

"Industrial-arts men were persuaded to affiliate with the state association of superintendents and principals."

"We just naturally draw closer every year."

"They are beginning to see the natural union of interests."

"They are highly organized state-wide but not affiliated with us. We have never been able to bring this about."

"Numerous clubs may soon form a state organization and later, we hope, join us."

"Some of our teachers are thinking about affiliating with the National Industrial Arts Association."

"We have no controversy of any kind."

"There is a definite line drawn between industrial arts and vocational education. We are attempting to pull them together."

"In our larger cities they tend to join the state and national associations."

"Some feel they do not derive benefit enough and can't attend annual conventions."

"They feel it is just another cultural subject. The two philosophies do not coincide."

"There should be very close cooperation among all forms of practical-arts education and vocational education. I would favor broadening our name to Practical Arts and Vocational Association."

"We need written argument as to union or affiliation. Industrial-arts men don't understand."

"Sometimes think they would rather have a state association of their own but they never get to it."

"They are now seeking affiliation and a plan will be worked out this year."

"They take little interest in us or in themselves but they are a fine group of men."

"They don't see the functioning of the A.V.A. They see only fees and faraway conventions."

"There seems to be no more connection between industrial-arts teaching and trade teaching than there is between the study of physiology and preparation for the practice of medicine."

"We have very pleasant relations."

"Our teachers are satisfied with their relationships with state and with A.V.A."

"Few have ever joined. Complete lack of interest in A.V.A. They are a fine group of capable fellows."

"The A.V.A. and state associations have sufficient vocational problems to solve without delving into industrial arts. Their inclusion would be wrong."

"They have their own organization and most of them, from choice, are not in A.V.A."

"We have repeatedly encouraged them to join us."

"They hold membership in Industrial Arts Association, state, and A.V.A., if they like. We urge total membership."

Here, then, we have the picture—in so far as this technique and these materials will provide it. Further study, especially, by use of constitutions, bylaws, and descriptive bulletins, may well be made. Better still we may well proceed to scrutinize our several divergent plans. These areas of education are too important and their problems too pressing to countenance lack of unity. When a football band seems correct and knowing, we enthuse and applaud and want to go with them. When they show confusion, we slump with a sickly smile. We *feel for them*, wishing they might have had more time to get together on their formations before taking part in public.

The A.V.A. as a co-ordinating body and all of the contributing state associations should be ever alert to problems of group service and representation. Our stated patterns of organization and our unwritten understandings should be constantly in revision to the end of clearness and unity and full-front progress.

The writer has no way of knowing the minor difficulties experienced in the several other fields. As to industrial arts, in which division he has special responsibility for a time, he feels that much improvement must and will be made. This article reviews the present status of the union of this group with others in mutual trust. It is not an argument as to whether or why industrial arts should continue or depart. Fair explanation of both viewpoints and strong convictions in the case of one must await a later opportunity for statement.

THINGS TO THINK ABOUT

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In most of life's problems, interest is not voluntary; it comes from grim necessity.

Interest is necessary in teaching, but it is not necessary that it be spontaneous, nor is it necessary that we depend upon the previous experience or the feverish imagination of youth to supply it. Interest is an essential factor in methods of teaching, but the probable demands of society, not childish interest, determine what we should teach.

It is the teacher's business to create a situation in which the student will be interested in learning the things which society will expect him to know rather than depend upon the passing fancy of a child to determine what should be taught.

It may be conceded that we cannot predict accurately all the things that society will demand of the adult a few decades hence, but unless our maturity, our experiences, and our judgment enables us to make a better guess than the child, we should abandon the profession.

The interests of children, like those of savages, are immediate. The disposition to look forward to, and to prepare to meet future situations, is one of the distinguishing characteristics of civilization.

What Is Information in Trade and Job Analysis

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Trade and job analysis is a technique by means of which the units of instruction in a trade or pay-roll job can be identified and listed for instructional purposes. It is an inventory procedure. Units of instruction are of two major kinds; namely, things that must be done and things that must be known by the trained worker. The former refers to manipulative or machine performance; the latter refers to mental functions related to the work. This article is concerned with certain difficulties that arise in connection with the latter.

Doing and Knowing

It seems desirable to make a statement concerning the *doing* units inasmuch as they are involved in this article. The doing units are frequently referred to as operations and also as jobs. The former term applies to service and custom trades as well as to production in industry. The latter term applies more directly to production jobs in industry. It has the *pay-roll job* connotation. The meaning of *job*, when applied to various trades outside of the production line, is that it is a *completed whole*. A good standard dictionary will be of help to the reader who wishes to delve into it. It is more important, however, to know that there are fundamentals that must be taught to a learner. They are the *doing* and *knowing* units. The doing fundamentals are more appropriately called operations according to practices in production industry and in service and custom trades. They involve depicting, shaping, and forming of materials, and assembling of parts. A single, a few, or a

large number of operations, may be involved in a pay-roll job in industry or in the repair or making of a product in a service or custom trade. The operations must be taught to the learner along with the *knowing* units or information topics that will be helpful to him in doing his work.

The information topics include the mathematics, science, trade terms, safety, or any other information that the worker should know, together with ability in performance of operations, in order to do his work properly. They are variously referred to, if placed under classification, as trade knowledge, job knowledge, related knowledge, auxiliary knowledge, information; and there are other terms. Most literature now available does not clearly define these terms so they can be used with some degree of uniformity. Consequently, practices in teaching information related to trades and production jobs in industry are varied and confusing; and disagreement arises in identification of assignments for related subjects teachers, co-ordinators, and shop teachers.

Any information that is necessary for a workman to know in order to form judgments in doing his work properly should be identified as such and taught to the learner before other information is covered, otherwise he will be handicapped or seriously hindered. Some of it may not be directly related to the job in hand but it may be marginal and yet necessary to know. Any such information should be classified under one heading as *must* information. An inclusive term should be used to cover it. The many terms now in use, and they have varied meanings, are difficult to follow.

The term *technical information* is an inclusive term that will fit any kind of information that will help the worker to form judgments whether the information is direct or marginal in nature. Certain school subjects tend to fall into the *judgment forming* class. That is, they are subjects that are thought of as having technical value. They are technical subjects. Most information that is necessary for a workman to know falls in this class; therefore, the use of the term *technical information*. This term fortunately is usable with explicit meaning in any trade or industrial pay-roll job when it applies to information that must be known by the worker. It applies also in distributive assignments.

A few examples of technical information follow. All of these are topic headings and need further outlining in making the analysis complete. Space limits this detail in this article.

Machine Shop

1. Reading working drawings
2. Cutting speeds and feeds
3. Calculations for tapers
4. Indexing calculations
5. Abrasives and coolants

Mechanical Drafting

1. Clearances, finishes, tolerances, fillets
2. Machine-shop operations
3. Instruments and their care
4. Dimensioning rules
5. Threads, bolts, screws

Sheet-Metal Working

1. Sheet metals and their uses
2. Solders and fluxes
3. Areas, volumes, circumferences
4. Soldering coppers
5. General safety rules

Printing

1. Printer's measurements
2. Printing papers
3. Rules for composition
4. Classification of type faces
5. Principles of display

Unbleached Sulphite Pulp Manufacture

1. Sulphite cooking acid
2. Wood-chip cooking
3. Pulp treatment
4. Gaskets
5. Valves

Drugstore Selling

1. Pure-food laws
2. Licenses
3. Child-labor regulations
4. Customer-buying motives
5. Safety precautions

There are information topics, also, that are not necessary to form judgments on the job. Unfortunately they are frequently not separated from the technical information topics. However, they should appear in a separate list and should be taught after the technical topics have been covered. They are general in character, but not auxiliary or marginal as are some technical topics; they are helpful, but not necessary to execution of the work. The general nature of this information suggests that they should be referred to as *general information topics*. This term can include any information that is good for the worker to know but not necessary to the forming of judgments on the job. For instance, knowledge of the making of paper is good for the printer to know but it is not necessary for him to do his work. Yet such information has its place in a training program.

A few examples of general information topics appear below. The examples given need further outlining.

Machine Shop

1. History of drilling
2. Manufacture of iron and steel
3. Shapers in the tool and die industry
4. Development of the lathe
5. Making of grinding wheels

Mechanical Drafting

1. Metals in manufacture
2. Engineering and art
3. Development of reproduction devices
4. Drafting papers and manufacture
5. World language

Sheet-Metal Working

1. Manufacture of sheet iron
2. Manufacture of galvanized iron
3. Manufacture of copper
4. Manufacture of tin plate
5. Socio-economic importance of tin

Printing

1. Printing in America
2. Invention of printing
3. Gutenburg, Caxton, Caslon, Bodoni, Goudy, Manutius
4. Papermaking
5. Composition of books

Unbleached Sulphite Pulp Manufacture

1. History of the sulphite process
2. Manufacture of paper and paper board
3. Use of sulphite waste liquor
4. Manufacture of other kinds of pulp
5. Pulp bleaching

Drugstore Selling

1. The early drugstore
2. Manufacture of light paper articles
3. Development of patent medicines
4. Ready prescriptions
5. Changing trends in drugstore merchandising

A third type of information has appeared rather recently in trade education. Vocational guidance involves information that is related to choosing, preparing for, securing, holding, and making progress in an occupation. Information that is helpful in counseling trade students in relation to these points should be included in an analysis. Vocational guidance should be integrated in all school service, and certainly in vocational education. It was thought unnecessary at one time inasmuch as the learners were assumed to have made their choices. This has proved doubtful. Guidance is a continuous process, it goes with training and beyond the training period, and certainly it is important in a program of trade education.

Examples of guidance topics that accompany the occupations already sampled are presented. As with the information topics already given, these need further outlining to insure full coverage in instruction.

Machine Shop

1. Occupational opportunities for machinists
2. The successful machinist
3. Opportunities for advancement
4. Jobbing shop ownership
5. Employer-employee relations

Mechanical Drafting

1. Opportunities in the drafting trade
2. Work of the mechanical engineer
3. Employer-employee relations
4. Training for draftsmen
5. Other kinds of drafting

Sheet-Metal Working

1. Increasing use of sheet metal and its socio-economic implications
2. Opportunities in the small shop and in production industry
3. Sheet metal in modern design
4. Employer-employee relations
5. Training for the sheet-metal worker

Printing

1. The printing trade
2. Opportunities in printing
3. Ethics of the trade
4. Hints for young printers
5. Apprenticeship, high school, trade school, college

Unbleached Sulphite Pulp Manufacture

1. Trends in the pulp industry
2. The sulphite process in the pulp industry
3. Opportunities in the pulp industry
4. Labor laws
5. Employer-employee relations

Drugstore Selling

1. Opportunities in the drugstore business
2. Owning a drugstore
3. The pharmacist
4. Ethics of the drug business
5. Departmental growth

All related information then can be classified under three headings — technical, general, and guidance. When classified thus, and when they are understood and agreed upon by the analyst, the teacher trainer, the related subjects teachers, and the co-ordinator, the assignments become clarified and friction over responsibilities is reduced.

It is unwise to classify too much. There has been too much classification in analysis procedures. The fewer the classifications the more logical and psychological the procedure in organization and in teaching.

A Common Difficulty

An operation should be reanalyzed into operating points or steps in sequence. This makes certain that every step in an operation is fully covered when demonstrated, or, if an operation sheet is to be written it serves as an outline. There usually are *doing* steps and *knowing* steps in an operation and they must be taught by the teacher in proper sequence. They fuse in the nervous system when learned and they give meaning to the operation. If separated, the operation lacks meaning; there is no operation. These steps should not be separated on paper and placed under *doing* and *knowing* headings. Even if they are separated on paper, it will be necessary to put them together again when instructing.

Examples of machine-shop operations further broken down into steps follow.

Lathe Operation
How to File Cylindrical Work

Operating steps:

1. Very little filing needed. Too much filing will cause uneven and inaccurate work
2. Select a mill file
3. Double the speed used for turning
4. File with long, slow strokes, little pressure
5. Release the pressure on the return stroke
6. File left handed to avoid striking the dog
7. Overlap with each succeeding stroke of the file
8. File to a smooth surface

Shaper Operation
How to Finish Cut Horizontally

1. Grind and set finishing tool
2. Set fine feed, or very coarse if for a flat tool finish
3. If same tool is used for roughing and finishing, all that is necessary is to keep it sharp and change the feed
4. Turn on the power
5. Engage the clutch
6. Hand feed to finish size
7. Engage the feed mechanism

Note that steps 3, 4, 5, 6, 7, 8 (lathe) and steps 1, 4, 5, 6, 7 (shaper) are mostly manipulative in nature and steps 1, 2 (lathe) and steps 2, 3 (shaper) are mostly informational or mental in nature. Note also that it is difficult to classify these steps as wholly manipulative or wholly informational. There is fusion of thought and doing even within the steps. It is a question of degree of each. Perhaps there is more emphasis in degree of doing in the illustrative shaper operating steps than in the lathe operating steps. This shows the integrative nature of *doing* and *knowing* in a given operation, which is a good reason for not placing them in separate columns. They should not be separated on paper by placing the manipulative steps in one column and the mental points in another. Yet many analysts are doing just that and referring to the mental points as information topics. It is unpsychological, and certainly unnecessary. Why separate them on paper when they must be put together again when instructing? These items of information are inherent in the operation. They belong there. They belong with the manipulative steps and help make the operation; they give entity to the operation; the operation would not exist without the mental function attached to it.

Let the operating steps be kept together in analysis and taught by the shop instructor in sequence of occurrence in the operation whether they are manipulative or informational in nature.

Other attempts to identify information by relating it to the component parts of an operation have resulted in the assumption that the manipulative part is the actual *doing* and the information is knowing how it is done. Examples taken from literature follow.

Trade or job	Operation	Doing	Knowing
Lathe (machine shop)	To knurl	Knurling	How to knurl
Printing	To set line of type	Setting type	How to set type
Drafting	To draw standard threads	Drawing threads	How to draw threads
Fireman	To build a coal fire	Placing materials	How to place materials
Sulphite Pulp Manufacture Acid maker	Test the burner gas	Testing gas	How to test

The points under the *doing* and *knowing* columns in the foregoing, belong together and should not be separated on paper because, just as in the previous statement covering the steps in one operation, they must again be placed together when instructing. How can there be logic in saying that *setting type* is the doing unit, and *how to set type* is the knowing unit? How can one teach the setting of type without teaching how? The *how* part of it gives existence to the operation.

This certainly does not define what the shop instructor should teach and what the related-subjects instructor should teach. It complicates their assignments.

What Is an Information Topic?

A genuine information topic is not created by doing the unpsychological thing just mentioned. Technical information topics hold rank with operations but they are not part of the operations. They involve important study assigments in mathematics, science, safety education, terminology, and so on. They involve any knowledge that is necessary in getting the work done properly in a particular trade; but they are not the mental functions of an operation. In printing, *printer's measure* and *kinds and identification of paper* are information topics and they do not appear as part of any operation. They belong in combination with operations in getting assignments done. There may be ten operations and three information topics required of the printer to print a certain job.

Information topics usually do not match the operations in number; that is, there may not be one information topic for every operation. Automechanics is one of the few trades where this is likely to occur extensively and it is because automechanics is largely an informational trade. Information topics in automechanics are likely to outnumber the operations. The information topic has an entity of its own as does an operation. And the nature of the trade or pay-roll job determines the nature and the number of information topics required. Some trades and production jobs require little if any information outside of that inherent in the thinking required to perform an operation.

In Instruction

If a related-subjects teacher or a co-ordinator were to teach the *how* of an operation and the shop instructor were to teach the *doing*, there likely would be difficulty. The classroom teacher could not teach how without *doing* something and the shop teacher could not teach the *doing* without integrating the *knowing* with it. One teacher may accuse the other of teaching things that belong in his area of instruction. Furthermore, when slight differences of opinion occur in the manner of doing an operation, there may be friction.

The shopman should teach any information that belongs in an integrated way with the work. Why send a learner in the print shop to another teacher to learn the *how* of the work? It is best taught by the shop instructor. The related-subjects teacher should limit his responsibilities to the major classifications of information and he should cover them in far greater detail than is possible by the shop teacher. The co-ordinator should see that there is proper distribution of responsibility, and all concerned should know the proper meaning of information.

Industrial-Arts Education

1. *Motivates* other subjects
2. Provides *exploratory* experiences
3. Affords opportunities for *creative work*
4. Teaches regard for *safety*
5. Develops *judgment* about tools and materials
6. Forms a basis for *leisure-time hobbies*
7. Discovers individual *interests*
8. Creates *consumer* appreciation
9. Contributes to *cultural development*
10. Develops *"handy-man" ability*

— Westchester Industrial-Arts Club

We ought not to look back unless it is to derive useful lessons from past errors, and for the purpose of profiting by dearly bought experience. — *George Washington.*

Five Hundred Years of Printing

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Typographic printing was first used successfully in the year A.D. 1440, having been devised by one John Gutenberg in Mainz, Germany. Centennial commemoration of Gutenberg's invention is not a novel occurence in 1940. The first centenary observance was held in 1540 in Leipzig. In 1640 there were nine city celebrations, and 62 in 1740. This writer has no information relative to observances of the fourth centennial in 1840, but we know that the fifth centennial was widely recognized throughout the world in 1940.

Five centuries of printing, "The Mother of Progress," "The Art Preservative of all Arts," regarded by most historians as the greatest event in human civilization next to the invention of the phonetic alphabet — how shall we contemplate this great boon to mankind? An academic approach might be from the standpoint of printing production and printing consumption. This could be personalized by discussing the viewpoint of the printing producer and the printing consumer. It will be more interesting to individualize our survey by looking from the vantage point of 1440, first, through the eyes of the printing craftsman who is interested in the evolution of his art, then with the vision of the world citizen who would appraise the function of printing in human affairs, past and present.

What Did Gutenberg Invent?

In reviewing the mechanical development of his art, the printing craftsman asks, just what did Gutenberg invent? This question is prompted by the knowledge that by 1440 the method of block printing was in common use throughout central and southern Europe. The printing that Gutenberg devised was *typographic* printing, that is, printing from movable types. His real invention was the method of making types by casting them in an adjustable mold with separable matrix, and the making of the matrix by means of a punch was the essence of the invention. He also had to devise means of composing his types and securing them in a frame or chase, of producing and applying ink, and of securing a suitable impression on paper.

Unfortunately, the available information concerning Gutenberg and his printing activities is rather meager. He left no relics, writing, or memorabilia of any kind to indicate how he came to conceive the process or the procedure through which he brought it to perfection. We know of only one written statement by him, a colophon of a book printed near the close of his life. Much of our information concerning him is found in court records of litigation in which he was deeply involved. Nothing is known of the circumstances of his death late in 1467. Says DeVinne in his book, "The Origin of Printing," "We have to conclude that John Gutenberg, the inventor of the greatest of modern arts, died, weighed down by debts and unattended by wife or child."

Naturally, much of myth has been circulated concerning Gutenberg and his work. In this category may be placed such stories as the carved wooden block being accidentally dropped and breaking in pieces, thus suggesting separate types; or of the impression of tree bark pressed against a piece of paper by chance. Would that Gutenberg had left such a clear and authoritative account of his work as did Friedrich Koenig who invented the cylinder press.

The Mechanical Development of Printing

Our craftsman notes with astonishment that Gutenberg's method of setting type continued with no improvement for four and a half centuries, until the advent of the linotype 50 years ago. But methods of presswork made greater progress. Gutenberg's press, with vertical screw and stationary bed, giving an output of twenty impressions an hour, was improved about the year 1500 by introducing the sliding bed, the tympan and frisket, which increased the output to two hundred impressions an hour. The next important change came about 1800 with Stanhope's iron press. Thereafter, improvements came more rapidly — the flat-bed cylinder press of Koenig in 1814, the clamshell platen press, the Hoe "type revolving press," the two-revolution flat-bed cylinder press, the rotary web press which now turns out our newspapers at such terrific speed, and the offset press.

Another phase in the development of printing that intrigues our craftsman is with reference to what we call typography. Gutenberg's forty-two line Bible was a faithful reproduction of the excellent standards of bookmaking that had been developed by the scribes and copyists, with reference to columns, margins, and ornamentation. Early printers added such features as printer's name and emblem, date and place of printing, title page, headlines, numbering pages, printing in colors, spacing with leads between the lines, marginal notes, ornamental borders, and initials.

With pride our craftsman recalls the great bookmakers who have honored the art, such names as Aldus Manutius, Geoffrey Tory, Claude Garamond, Christopher Plantin, the Elzevirs, Giambatista Bodoni, and so on down to William Rudge and Bruce Rogers. The great type designers are commemorated, from Nicholas Jensen, who perfected the classic roman face in 1470, to Frederick Goudy. Our craftsman acknowledges his debt to the typefounders who during the past two centuries have rendered indispensable service in the development of the printing art — Pierre Fournier, the Didots, David Bruce, Henry Barth, John Marder, Sr., and Linn Boyd Benton. And to this list must be added the name of him who gave the world the composing machine, Ottmar Mergenthaler.

With some humiliation our craftsman notes that improvement in typography has not been uniformly consistent through these five centuries. At times, the quality of the printed matter has sunk to low levels. In 1686, in France, a royal edict required that licenses to print books should be conditioned upon stipulated qualities of type, paper, presswork, and accuracy of text. From other slumps of typographic excellence, printing has been rehabilitated by such men as William Caslon and William Morris. To maintain high standards of typography, we now have the various graphic-arts societies.

The names of those who have contributed to the development of printing during five centuries make an impressive list, too numerous to recall in one moment. But to refresh his memory, our craftsman has the advantage of the historical research of such authors as Isaiah Thomas, Professor Thomas Carter, Theodore L. DeVinne, William Dana Orcutt, John Clyde Oswald, Alfred Pollard, Daniel B. Updike, and Henry Lewis Bullen.

On one point our craftsman may proudly boast: His art has freely utilized the inventions and scientific discoveries of the technological age that has grown out of the Industrial Revolution. Photography, initiated by Niepce and Daguerre, has been used by Ives and Horgan to produce the half tone and color process printing. The accidental discovery of lithography by Alois Senefelder was the genesis of a major branch of the printing industry. Chemical research, metallurgy, machinery construction, applications of electricity, more and more rapid means of communication and transportation — all these are zealously appropriated by the printing art to produce huge quantities of publications, to collect news for them quickly from the ends of the earth, to print them in bulk, to distribute them widely to a numerous reading public, and to carry much advertising to pay for them.

If he be statistically minded, our printing craftsman receives a thrill when he looks up data concerning the magnitude to which his industry has grown in five centuries. According to the United States Census of Manufactures, printing and

publishing has since 1925 ranked first among all industries in the average number of establishments, number of wage earners, amount of wages paid, and value added to products of manufacture. The fluctuation from year to year on these points has been less than that in the eight other major industries, showing that the printing industry is more stable than any other except the food industry which it parallels in some features.

Time will not permit us here to mention the essential service of inkmakers and papermakers and other accessory contributions to the mechanical progress of the printing industry. So, leaving now our printing craftsman to enjoy the emotions that come from reviewing the development of his old and honorable art, let us turn to the more profound contemplation of the world citizen while he appraises printing as the handmaiden of civilization. He will wish first to look at the world into which printing came in 1440.

Why Was Printing Invented?

The invention of typographic printing was an event in the period of the Renaissance. The emerging Occidental Civilization had slowly risen from the low level to which European culture descended following the decline of the Roman Empire, through the centuries of feudalism, when the manor was the chief social-economic unit, and when the church was the only cohesive agency in Europe. The Church, in its monasteries, preserved a large remnant of the learning of the Greco-Roman civilization, but this in itself did not affect the masses of Europe. Slowly developing trade had resulted in the rise of towns and cities. This trade had produced a burgher class of craftsmen and merchants who accumulated wealth with which they could challenge the power of the feudal nobility. The broadened horizon of these burghers caused them to crave for more knowledge such as could be had in books, and they could afford to buy books. To meet this new zeal for learning (which was the chief characteristic of the Renaissance) the monastic schools were developed into universities, in which the copying of books became a flourishing industry and the work of the scribes an important occupation. And there came a need for more books than the scribes could produce, and this need was consequently met by typographic printing.

Nothing could better demonstrate the fact that the world needed and was ready for printing than its rapid spread after its advent. In 1465 two German printers, Swyenheim and Pannertz, set up a printing plant in a village near Rome, and two years later removed into the city of Rome. Thus printing was introduced into Italy thirty-five years after Gutenberg's invention. In 1470 the first press was set up in Paris by three German printers. In 1471 we find recorded a strike of compositors in Basle, Switzerland. In 1475 William Caxton printed the first book in English at Bruges in the Netherlands, and the following year he set up the first press in England at Westminster. Portugal saw its first printing plant in 1487, and Turkey the following year.

All this was within half a century of Gutenberg's invention and before Columbus discovered America. Within another half century, that is, less than a century after the invention, the first press was established in the New World in the City of Mexico in 1538. In 1584 a press was set up at Lima, Peru. The second centennial of printing saw the third press established in the New World and the first in British North America — the famous Stephen Daye press at Cambridge, Mass., set up in 1638, eighteen years after the landing of the Mayflower at Plymouth.

Measured by our 1940 tempo, the progress of printing during its first two centuries may seem slow. But considering the economic and industrial conditions of the fifteenth and sixteenth centuries, the progress was indeed rapid.

Our world citizen will ask why was not the simple art of typographic printing discovered by one of the great ancient civilizations — the Egyptians, the Babylonians, the Greeks, or the Romans, all of whom used some form of writing? This question is raised with reference to each of these civilizations by H. G. Wells in his "Outline of History" (best seller some twenty years ago). He suggests, as an answer, the lack of suitable and abundant printing material. He reasons that the supply of paper that had become available in Europe in the fifteenth century was the necessary factor for the advent of typographic printing. If this reasoning were valid, the Chinese would have invented this form of printing long before the eleventh century when Pi Sheng experimented with movable type of both porcelain and metal, for they had made paper since the second century. They gave to the world their invention of paper, but not their movable type. The reasons why their typographic printing was not successful are three: (1) The cumbersomeness of their alphabet made the use of carved blocks more economical than separate types. (2) Their liquid ink was not suitable for use on porcelain or metal surfaces, and they never succeeded in producing a paste ink. (3) They did not use a press, but tried only the brush method of impression used with their block printing.

In Germany in the fifteenth century, not only was a paper supply available, but the painters of the low countries had discovered the oxidizing property of boiled linseed oil which formed a hard-drying and permanent vehicle into which they mixed lampblack, also abundant, as a pigment. Thus there was available to Gutenberg a suitable ink. He also realized the need for pressure in transferring the ink from the type to the paper, for which he probably adapted the wine press or cheese press then in common use.

But paper, ink, and press were not all of the factors necessary for the success of typographic printing. The real incentive to the invention of movable type by Gutenberg was the growing number of potential readers who demanded books in quantities that made printing a profitable method of production. Without eager readers, printing could not be a commercially successful industry. The lack of readers, as well as the lack at the same time of paper and ink, is the reason why the ancient civilizations did not invent typographic printing.

Printing's Contribution to Civilization

We have seen that printing came into the age of the Renaissance, an age of liberation — liberation from the class levels and codes and baronial power of feudalism; liberation from the intellectual authority of the ancients; liberation from the narrow range of geographical knowledge; liberation from ignorance of scientific truths.

Once Occidental civilization had thrown off the literary and esthetic limitations of humanistic learning and had freed itself of the authority of known Greek writings, especially the works of Aristotle (which liberation required a couple centuries yet after the invention of printing), then the typographic art was available to give immeasurable aid in extending the new scientific learning.

Printing's Service to Democracy

Our world citizen discerns that the great glory of the art of printing is not alone in its function in promoting scholarship and higher learning, but in its direct service to the common man. One historian says: "The invention greatly strengthened the position of the middle class, the true carriers of the Renaissance. After a few decades of the new art, books printed in Latin, to be read only by scholars, were greatly outnumbered by those published in the various European vernaculars. Plainly, whoever wished to be read must henceforward circulate his ideas in the language of the street and the home."

The language of the street and the home is the language of journalism. Barely a century after Gutenberg's invention, the first printed newspaper was issued in Venice in 1536. To what stature had this phase of printing grown in four centuries. And what a noble record of achievement has it made in the cause of human liberty!

Our world citizen observes that the enlightenment spread by printing has aroused oppressed peoples to fight for their inalienable human rights. He notes how circulation of the printed word has contributed to the rise of democracy. The inevitable loss of power and domination which autocratic governments saw as a result of the enlightenment spread by printing has caused them either to curtail and suppress printed matter, or to attempt to control it in their own interest. Since the first license to operate a press was issued by

the Bishop of Mainz in 1485, the battle for freedom of the press has waged incessantly.

We recall the contemptuous utterance of Sir William Berkeley, colonial governor of Virginia, who, in an official report in 1671, wrote: "I thank God we have not free schools or printing; and I hope we shall not have these for a hundred years. For learning has brought disobedience and heresy and sects into the world; and printing has divulged them and libels against the government. God keep us from both."

Freedom of the Press

The first newspaper in the British colonies in North America, entitled "Publick Occurences, Both Foreign and Domestic," printed in Boston in 1690, was suppressed after the first issue. In 1704 the first regular American newspaper, the "Boston Newsletter," was published under license and continued as a Tory newspaper until the Revolutionary War.

In New York City the first newspaper was established in 1725 by William Bradford who held the appointment as public printer. He continued the publication successfully until he retired from business in 1774. Being loyal to the British Crown, his newspaper was unmolested for half a century. But Bradford's competitor, John Peter Zenger who started the New York Weekly Journal in 1733, had a different experience. Because he was the first to champion the cause of the people against the authority and corrupt administration of the British Colonial Governor, Zenger was arrested and imprisoned on the charge of seditious libel. His famous trial and acquittal in 1735 was a distinctive victory in the fight for freedom of the press in America.

Our world citizen must by all means notice the place occupied by Benjamin Franklin in the rise of journalism in America. Franklin was a better than average compositor and pressman, but he never contributed anything outstanding to the mechanics of printing. His fame rests on his inventions and achievements in other fields — his scientific studies, his service as a statesman in the cause of American independence, and above all his ability as a writer and editor. He made vigorous use of advertising. He carved and printed the first newspaper cartoon, the famous picture of a rattlesnake in thirteen sections with the caption "Join or Die." He promoted newspapers in other states, from Connecticut to North Carolina, thus establishing the first chain of newspapers under one control. His propaganda activities by means of leaflets printed on the press set up in his living quarters in Paris while he was on his mission in the cause of the American Revolution, is related commonly in school histories.

General George Washington sponsored the establishment of a newspaper during his campaign in New Jersey. With the British then in control of New York City and censoring the newspapers printed there, General Washington wanted the residents of New Jersey to know what was going on in other colonies. So in 1779 he encouraged a young officer in his army, who was a printer, to start a newspaper. This publication has had a continuous existence ever since, being now the Elizabeth Daily Journal, the seventh oldest newspaper in the United States.

Not alone in America has the battle been waged for freedom of the press and the cause of liberty. It is a question what form the French Revolution might have taken or how successful it could have been without the aid of the printing press. The unparalleled agitation of public opinion in France in the year 1789 was stimulated by the innumerable pamphlets and newspapers which reported the events of the day and exhorted against existing institutions. Napoleon Bonaparte on coming into power imposed severe censorship, but in his exile at St. Helena he admitted that freedom of the press was best for the welfare of the country. Is it possible to think that Adolph Hitler or Joseph Stalin may some day experience a like change of attitude?

Our world citizen traces the further development of the press through the period of intense personal journalism, with such names as Charles A. Dana and Horace Greeley, the harnessing of the electric telegraph and the development of the world-wide news-gathering facilities, to the recent rise of columnists as a prominent newspaper feature, also the use of profuse photographic illustrations. He sees how the noble art of printing is utilized to record the most trivial and sensational back-fence gossip, or to publish "all the news that's fit to print." He notes how transient are the low-minded journals, how dignified and influential are the great newspapers of high editorial standards like the New York Times and the Herald-Tribune, which are widely used as instruction texts in schools of their area.

The press is not completely free in the United States of America. It is subject to many inhibitions, and this will probably always be so. But the press enjoys a greater degree of freedom here than in any other country in the world. The reason for this is that the leaders in American journalism are for the greater part high-minded patriots who are concerned with the welfare of society, and who will not abuse the freedom which they enjoy. It is in the hands of such men that printing becomes the beneficent and efficient servant of mankind.

In itself, printing has no ethical or moral code, no conscience or volition. These are attributes of those who use or produce printing. When our world citizen beholds the display of printed matter on any public newsstand, and observes the bizarre and suggestive titles and pictures there exhibited, he may wonder whether the art of printing is really a servant of the better elements in our civilization, or whether it is being prostituted to the most unscrupulous and debasing influences. The battle between virtue and vice is eternal. But the survey of five hundred years of printing heartens us to believe that this great art will continue to serve the economic, moral, and spiritual needs of mankind with increasing efficiency.

What About this Thing Called Guidance! — An Answer

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The article on "What About This Thing Called Guidance!" which appeared in the September, 1940, number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is, of course, a challenge to all persons who are engaged in guidance work.

The author of that article has been in guidance work more or less during the past thirty years, and has become somewhat pessimistic with regard to his labors in this field. This writer can claim only nineteen years in the work, but he believes that the assumption that it is useless to try to help youth make a vocational adjustment, because of the rapid changes in business and industry caused by inventions and other things, and because the planning of youth is only "wishful thinking," is entirely wrong.

Edison said, "Unless a boy has made up his mind what he wants to be by the time he is sixteen years of age, he will not amount to much." It is this writer's opinion that Edison was fundamentally

right. Aptitude tests given to more than one thousand 9A students in the Knoxville public schools and repeated in grade 12A to the same students, indicate a change in vocational interests on the part of only 18 per cent of the pupils. There was a greater change in the I.Q. scores of these students than in their aptitude scores.

The fact that less than 18 per cent changed in the aptitude ratings indicates that the test used possessed considerable reliability in the measuring of fundamental inclinations. Surveys of these same students who went to college and into business and industry indicate that about 85 per cent have gone into work in keeping with their vocational inclinations as indicated by the 12A tests. This is a very high percentage when you consider that a number of persons in a community of this size often are forced by circumstances to go into occupations of their second or third choice. This is particularly true of persons who are talented in art, music, and other fields where such talent must seek employment usually in the larger cities.

Various studies will show that in a well-organized school system, where pupils have been given an opportunity to study various occupations, their vocational aptitudes come to the surface as early as junior and senior high school age. Studies will show that these inclinations are, in the vast majority of the cases, quite permanent.

Three years ago a study was made of the lives of the great musicians. Nearly all of them were well on their way to vocational success before they were in their teens and most of them before they were 12 years of age, some as early as ages 8 and 10. This shows unmistakably that aptitudes do develop early in life, and if we cannot discover them and show the pupils how to find them, it is a reflection upon our educational methods. In fact, it is a very simple matter now to determine certain aptitudes for groups of occupations before students complete high school.

It is a mistake to try to direct any young person into one particular occupation. We should direct him into groups of occupations, such as social service, literary, law and government, artistic, mechanical designing, mechanical construction, and scientific. This is exactly what is done in the Knoxville public schools, using the Gentry Vocational Inventory, published by the Educational Test Bureau, Minneapolis, Minn. The studies referred to in the foregoing were made on the results of these tests.

The young person should be directed into groups of occupations so that he can make the necessary adjustments when the rapid changes in industry make it necessary to change occupations. The person who is fitted for one occupation is, of course, fitted for several in a kindred group, such as mechanical. Very little training is necessary to change from one occupation to another if the person knows the group of occupations for which he is fitted. For instance, the radio decreased the sales of phonographs, and the cabinet-makers for phonographs began to make cabinets for radios.

It is the natural tendency of a person who has been in an occupation for fifteen or twenty years to get the idea that that is the only kind of work he can do. Of course, he can do many other things, and if a number of persons had realized this during the depression, there would have been fewer suicides. In our guidance program in Knoxville we are urging young persons to remember that they are fitted for groups of occupations and not necessarily for one. They are directed, therefore, to study such groups, and led to make special investigations so that they can find the occupations which both fits their interests and their ability by a process of elimination. Also, of course, they must be guided by the opportunities for placement offered by that occupation.

The author of the article in the September issue seems to think that great men and women in history did not plan their lives. If this is true, and there is room for doubt, it was due to a lack of good educational methods. The dreams were there just the same, and their inability to plan was due to the lack of knowledge of themselves and the world about them.

The author of that article also states that the typical boy takes any job he can get, holds several, and finally drifts into work where he can find a certain degree of satisfaction. That is a serious reflection upon the intelligence of modern youth, and also an indictment of our public schools. If he refers to boys who often try one or two occupations in the group for which they are fitted, he is perhaps right. However, there is less and less of this each year. My experience in placing graduates with businessmen in the past few years shows that employers today are very careful in selecting their employees, and are selecting them according to their vocational aptitudes. If they did not, it would be a serious reflection upon the efficiency of modern business. Also, businessmen are very reluctant to employ a boy who has drifted from one job to another. Most of our well-established business firms take boys right out of high school, and in the majority of cases the boys stay with them. Any number of instances can be given to show that this is true.

The modern personnel director recognizes that there is such a thing as being naturally fitted for certain groups of occupations. The efficiency of modern business is based upon this assumption. Edison could not have been a Shakespeare and Shakespeare could not have been an Edison. That we differ in our vocational potentialities has been recognized by a great body of philosophers from the time of Plato to the present.

The other article also refers to two surveys, one made in Miami, Fla., and the other in Hibbing, Minn., of the vocational choices of several thousand high school students. The findings show that the students were vacillating in their choices. This no doubt is true, but if these communities had had well-established and well-organized vocational guidance departments, that had given the students an opportunity to make a careful study of occupations, beginning in the seventh grade, and a great deal of testing, the results might have been quite different from what these surveys show. Who can blame students for not being settled when their educational systems have not given them adequate guidance?

Try guidance as it should be given, and if the reader will pardon the personal reference, as we have tried it and proved it in Knoxville, and pessimism will change to a strong feeling of optimism in regard to guidance in general.

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English in Industrial Arts

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Industrial-arts vocabulary building is accepted as a part of the responsibility of the shop teacher, but giving attention to English habits in a shop class is not so generally recognized as a part of the shop teacher's job. Nevertheless, the use of correct English and the development of proper English habits constitute a legitimate portion of the creative efforts of every industrial-arts teacher.

Good professional thinking has long ago abandoned the idea of just a workshop in the school, a place where normal boys spend an hour a day working with tools, and learning only manual skills. This setup has been replaced by the industrial-arts shop or department where boys may learn about industrial processes, conditions, commodities, occupations, and where they may acquire a considerable knowledge of how to use the hundreds of mechanical devices with which they are constantly surrounded, and which all of us are using in increasing number.

The industrial-arts teacher has so far concerned himself solely with such materials and such information as are naturally related to his field. Among other teachers in special fields, he must teach an extensive technical vocabulary, and this has probably been the extent to which English has played any part in industrial-arts content. English instruction has been considered the domain of the English teacher, just as mechanical things have been relegated to the shop, in line with the practice of departmentalizing public school instruction. The progressive view, however, holds that the child must be an integrated unit, that he acts and gives attention as a whole being, rather than by separate compartments or sections. When the child pursues industrial arts, or any other subject field, all of the tools of his common education are brought into play, English among them, unmistakably. If English is to function in *all* of the activities of a child, it cannot be confined to specific instruction an hour a day in a specified room. It must permeate *all* of the teaching which the child receives.

There are numerous opportunities in shop classes where spoken and written English can be emphasized. In discussions following explanations or demonstrations, in fact, in any conversation between student and teacher, the teacher should insist upon good English usage. All too often a boy attempts to express himself with a minimum of oral effort, and with very little thought to organization, because *this isn't his English class.* If the teacher insists at the very outset upon complete, acceptable English, students will soon get the idea and learn to speak accordingly. It is assumed that the teacher is well versed in English and is thoroughly capable in its use.

Shop teachers are, moreover, confronted at all times with the need for teaching the correct use of many technical terms and expressions, and the shop student needs to learn their spelling. Call this vocabulary drill if you wish, but it is a necessary adjunct to industrial arts and it represents functional English.

Written English can be taught through tests, reports on excursions, on investigations, and on related topics which are directly and naturally a part of the work being done in the shop.

This makes English functional, instead of a meaningless, boresome exercise. None of the activities enumerated are provided especially as media for English practice. They are industrial-arts activities through which English can function. Meanwhile, the English department is still at work and it would seem that an excellent way to motivate both spoken and written English among boys would be to draw upon all their shop activities. A boy is just naturally at home in shopwork, and thrives upon it. Shopwork is a natural medium for using his creative energy.

All of the foregoing is based first, upon the assumption that industrial arts is offered for its general educational values. It is generally agreed that its inclusion in the public school curriculum cannot at present be justified upon any other grounds. It follows, then, that the development of manual skills cannot be the principal objective, but that it can be one of several. Second, it is based upon the assumption, as has been indicated, that industrial-arts teachers are proficient in the use of English. Institutions training industrial-arts teachers should encourage only those who can read, write, and speak fluently and well. The charge that public school students use abominable English might well be laid to the fact that we have too much of departmentalized English; that we have confined it to one or two rooms in the school and have assumed that the English teacher, in an hour a day, can give pupils all the English knowledge they need. As a matter of fact, the English teacher needs the constant cooperation of all the other teachers, since all school subjects are taught through the mediums of reading, writing, and speaking. It would seem that more creative effort could be motivated through such cooperation.

An excellent cooperative method for the shop teacher in his English work would be to check up periodically with the English teacher and attempt to organize the oral and written aspects of shopwork around the devices which the English teacher is using at the time. The use of parentheses, quotation marks, forming plurals, proper uses of adjectives and adverbs, etc., are all emphasized from time to time in English and this emphasis could well be supplemented in shop writing and speaking. English teachers would welcome this cooperation in all the subject-matter fields.

The following are representative vocabularies from most of the branches of industrial arts. These vocabularies are by no means exhaustive or all inclusive, but they are fairly representative. Subject-matter teachers should be supplied with copies of these technical words and terms. They will hardly be familiar with very many of them, yet they would be enabled to supplement the work of the industrial-arts teacher when using industrial-arts themes in their own work.

Woodwork and Lumber

try square
framing square
T bevel
marking gauge
mortise gauge
dividers
crosscut saw
ripsaw
coping saw
compass saw
plane
working side
working edge
working face
chamfer
bevel
brace
auger
drill
gimlet
countersink
boring
chiseling
paring
whetting
spokeshave
dowel
nail set
joinery
dado
rabbet
cross lap
miter
dovetail
tongue and groove
mortise and tenon
toenail
gain
grain
texture
wind
shake
check
shrinkage
moisture content
kiln-dry
milling
plain sawn
quarter sawn
seasoning
veneer
plywood
heartwood
sapwood
lathe
drill press
jointer
surfacer
shaper
tenoner
mortiser
hand screw
wood screw
bar clamp
C clamp
bench hook

Patternmaking, Molding, and Foundry

shrink rule
combination square
firmer
socket firmer
tang
drawknife
pattern
draft
rapping
molding
flask
cope
drag
core
core prints
gate
core box
sprue
fillet
green sand
boxing
lagging
segmented
breaking joints
draw spike
rapping bar
strike-off bar
bellows
riddle
peening
ram up
pig
flux
crucible
skimming
charge
oxidize
pour off
tap
heat

dry sand
parting
skewering
slag
spoon
cupola

Carpentry

base
bridging
cap
framing
rafters
settlement
timber
clapboards
staking out
corner boards
cornice
crowning
cupola
hip roof
eaves
false rafter
gutter
floor slabs
forms
foundation
furring
trusses
casement
girder
heart shake
hip rafter
jack rafter
joist
lean-to
mansard roof
mullion
pitch
valley rafter
ridge
dormer
double hung
saw-tooth roof
sheating
shingle
skirting
slabs
battened
splayed
toggle bolt
transom
trim
wainscoting
gable
gambrel roof
siding
brick or stone veneer
studding
sill
balloon frame
water table
wet rot
dry rot
wind shake
apron
stiles

Concrete

batch
Portland
aggregate
form
puddle
grout
spading
tamping
mix
mortar
reinforcement

Electricity

generator
accumulator
static
current
armature
field
rotor
stator
open circuit
closed circuit
polarity
polarized
gravity
electrolyte
positive
negative
anode
cathode
insulator
conductor
nonconductor
resistance
ampere
ohm
volt
condenser
terminal
ground
magnetic
lines of force
attraction
repulsion
alternating
direct
phase
electromagnet
core
electromagnetic field
switch
collector rings
commutator
cycle
frequency
transformer
induction
radio
laminated
transmitter
short
open
high frequency
radio frequency
audio frequency
kilowatt-hour

Forging

forge
anvil
tongs
tuyere
fire tool
oxidize
clinker
flatter
set hammer
hardie
bob punch
necking tool
fuller
cone
banking
swage
horn
link tong
pickup tong
eye tong
drawing out
upsetting
lap weld
scarfing
fagot
temper

Sheet Metal

galvanized iron
tin plate
tern plate
alloy
solder
flux
sal ammoniac
zinc chloride
groover
locked seam
squaring shears
tin snips
burr
wired edge
scratch awl
bar folder
rivet set
crimping machine
burring machine
wiring machine
edging machine
turning machine
setting-down machine
beading machine
forming roller
sweating
cornice brake
candle-mold stake
blow-horn stake
square stake
round-head stake
needle-case stake
beakhorn stake
double-seaming stake
hatchet stake
bottom stake

Mechanical Drawing

drawing board
vellum
T square
dimension
triangle
scale
dividers
ruling pen
inking in
guide lines
nibs
tracing
blueprint
machine drawing
working drawing
irregular curve
crosshatching
arrowheads
title block
detail
projection
perspective
orthographic
isometric
section view
vanishing point
center line
elevation
axes
symbols
pictorial
ellipse
helix
intersection
plane
perpendicular
ogee
protractor
layout

Machine Shop

bore
counter bore
drill
file finish
grind
grind finish
knurl
polish
scrape
spot-face
turn
anneal
chipping
clearance
countershaft
rake
cutting angle
stud
cap screw
caseharden
chill
harden
temper
running fit
push fit
drive fit
force fit
shrink fit
mill
dog
mandrel
caliper
micrometer
welding
brazing
lathe
milling cutter
faceplate
headstock
tailstock
cone center
compound rest
chuck
reamer
helical
quadrant
babbit
bearing
die
tap
flute
pitch
carbon
carbide
vernier
chattering

A.S.M.E., American Society of Mechanical Engineers
R.P.M., Revolutions per minute
S.A.E., Society of Automotive Engineers
N.C., National coarse
N.F., National fine
H.P., Horsepower
B. & S., Brown & Sharpe Wire Gauge
B.W.G., Birmingham Wire Gauge
U.S.G., United States Gauge
F.A.O., Finish all over

Printing

copy
proof
imposition
locking up
make-ready
folding
collating
binding
case
font
family
quad
bold
condensed
italic
em
en
imposing stone
stick
compositor
galley
brayer
proof planer
form
furniture
planed
justify
quoin
quoin key
chase
lift
platen
tympan
throw off
grippers
gauge pins
spotting
delivery table
half tone
etching
distribute
impression
proof press

Gasoline Motors

internal combustion
2-stroke cycle
4-stroke cycle
intake
compression
power
exhaust
ignition
magneto
piston
piston rings
cylinder
wrist pin
propellor shaft
connecting rod
crankshaft
camshaft
carburetor
bore
stroke
compression ratio
cutout
spark
timing
distributor
lubrication
fuel pump
housing
water jacket
oil pump
water pump
head
block
crankcase
pan
L head
valve in head
rocker arms
tappets
push rods
poppet valve
octane
sleeve valve
transmission
differential
sliding gears
planetary
toe-in
camber
caster
kingpin
worm wheel
V type
straight

"Articulation of the school with society does not end when the pupil finishes the secondary school, or even when he drops out. Adults are attending in ever-increasing numbers, and should the program of the high schools become available to the adult population, there is no way of estimating the number who would respond." — *Principles of Secondary Education*, by *Cox and Long*.

To go about your work with pleasure, to greet others with a word of encouragement, to be happy in the present and confident in the future; this is to have achieved some measure of success in living. — *Edwin Osgood Grover*.

Aeronautical Courses in High School

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Aeronautics offers much to fire the imagination of the modern student. Three-hundred *flying* schools of different standards of requirements give ample evidence of the keen interest manifested. Aviation clubs and organizations are being set up. The progressive school system must find it imperative to include the subject in its curriculum.

The Civil Aeronautical Authority has for the past few years been working for a more air-minded nation. It has helped to establish approximately 400 ground and flight schools in the country. The plan in general is to set up standards and provide material and courses so that colleges and universities, if they meet definite requirements, may and can include aeronautics in their curriculum. The actual flight instruction is usually given by some near-by flying school, air service, or airport. Only 49 schools scattered throughout the country have been approved by the C. A. A.

What can the average high school do to include, at a minimum expense, aeronautical instruction which may be used as a prelude to further study along this line, or to permit exploration in this field?

Magazines treating of the subject supply the names and addresses of these flying schools. Teachers entering this field for the first time should study the contents of several bulletins in order to acquaint their classes with the standards required, fees charged, subjects taught, and other interesting facts. Educational guidance through suggestions of the studies to be pursued in high schools, will prove of great value in furthering an aeronautical career.

Roosevelt High School introduced this subject about ten years ago by forming a model aero club. Meets and contests with other schools were held. Special events were planned for individual types of planes. Interest grew and demand resulted in regular classes.

Aeronautical materials were gradually acquired from manufacturers. A near-by governmental flying field had received orders to dispose of considerable material. Persistent personal efforts on the part of faculty members added to our equipment. The Parent-Teacher Association endorsed the movement and gave moral and financial support.

At the present time the school possesses two complete planes and a range of motors dating back to world-war craft. Many of these have been cut away or sectioned and have been of definite aid in teaching.

Extra wings and control surfaces serve as a basis for duplication and study. Our instruments — many obtained from the navy — include approximately a dozen of each of the following: air-speed indicators, altimeters, compasses, fuel gauges, turn-bank and pitch indicators, and tachometers. As an aid in the teaching of navigation we have an earth-induction compass and drift meter. In addition, we utilize our regular woodshop for building of ribs and wing sections, covering of airlerons and rudders, doping and spraying of these surfaces. Scale models, wing patching, and small model propellers are also built in the shop. Propellers, antiques and later models, are an aid to study, and some have been sectioned.

Textbook needs have been filled from several sources. Many complete sets were obtained from the government. Our regular textbook list included a fair choice for later needs. Many manufacturers publish some very fine material and in most cases a letter on school stationery will bring sufficient copies for an entire class. These are numbered, passed to students for study and class discussion, later collected, and filed for future classes.

Two units, either of which may be taken first, *aero motors* and *aero flight* have been organized. Aero flight is given in our large woodshop where we have found the regular equipment is of real value. Provisions have been made for lectures and movies, and notebooks are a definite and very important part of the course. Students are encouraged to reserve a section of their notes for articles and pictures which they have found in magazines, daily papers, and other publications.

The theory as presented in aero flight begins with:

1. The history of aviation, nomenclature, landing gears, types of planes, aerodynamics, and drawing of ribs. Notes and drawings on fabrics used, methods of patching, and instructions for sewing and doping given.
2. Instruments should be sectioned and the drawings included in students' notes. The actual instruments studied are: air-speed indicator, altimeters, compass, fuel gauge, drift meter, turn and bank indicator, tachometers, and climb meters.
3. Air navigation treats of: deviation, variation, drift, time in and out, and value of the radio beam in navigation.
4. Meterology defines the Beaufort wind scale, types of clouds, visibility scale, weather symbols, land and sea breezes, hail and wind conditions and highs and lows.
5. The weather-bureau daily maps must not be omitted. They furnish a very graphic picture of atmospheric conditions.
6. Aeronautical texts present a study of maps and naturally this brings us to latitude, longitude, difference in time zones, the Great Circle route, and Rhumb lines may be compared.
7. Such subjects as the autogyro, parachutes, balloons, and airships furnish an endless opportunity for discussion.

Aeronautics is a new subject in a fast-moving field. The teacher must be ever alert for the latest developments.

Fascinating procedure incites curiosity; interest attains a high pitch and an animated response of potential aces!

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Bonds of Brotherhood

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Vanishing Treasures

The things one comes to treasure in life may be material, mental, or spiritual, but the full degree to which they are treasured is never so completely realized as when there is danger of losing them. Good health is taken too much for granted until sickness comes; safety is too frequently assumed as a matter of course up to the moment of the accident; bounteous food is eaten, often with no thought of its blessing, only to be appreciated when the lack of it brings on the pangs of hunger; and the joy of a job once held seldom means as much as when one tramps the streets without it.

There are certain bonds of human relationship the value of which is too likely to be overlooked or lightly considered until they become strained or severed. These bonds embrace the entire span of human experience from family life to national life and even beyond. They are found in the nursery, the schoolroom, and on the playground; in the laboratory, the shop, and the library; at the office, the factory, and the courtroom; at home, at church, and in government. When relationships in these various situations continue satisfactorily little thought is given to them, but when tension develops there arises a feeling of concern.

It seems appropriate that as the Christmas season approaches we may think upon the ways in which desirable relationships may be strengthened. Regardless of race, creed, or nationality, Christmas may carry such a spirit, and thereby have a rich meaning for all the world.

Differences

In seeking forces which bind people together the mistake may be made of overlooking the significance of human differences. Two people may be unlike in abilities, in temperament, in stature, or in natural coloring, and still have the potentialities for friendship and congeniality. The simple lesson of the magnet demonstrates the fact that unlike forces are the ones which attract each other. Likewise in the human race the attraction of the members of the opposite sexes for one another is fundamental and perpetual.

Every teacher knows that there is no such thing as absolutely homogeneous grouping of pupils. They may be grouped within rough limits on one element, such as intelligence, but will be found to vary widely in other characteristics and capacities. Such differences show up in mathematics, art, music, drawing, and the various shop courses. Discord and failure are avoided and valuable educational results accomplished when the special abilities of one pupil are used to supplement those of a different nature in others.

Differences between people in any phase of life may serve to bind them together or drive them apart depending largely upon the attitude from within. They serve as a binding force if there is consideration for one's fellows, coupled with the desire, willingness, and ability to comprehend another's point of view. Such an attitude will not seek to eradicate the differences which are the seasoning of democracy, but will serve to utilize them to the limit of their possibilities.

Interests in Common

Whereas it may sometimes be difficult to recognize the amalgamating influence of differences between people, it is commonly accepted that like interests are responsible for the establishment and continuation of acquaintance, friendship, and association, often of lifetime duration. Certain factors which are readily recognized are race, nationality, political policy, religious belief, vocation, blood relationship, common friends, and like experiences.

Problems, troubles, and suffering often bring people together in a stronger bond than could be created in any other way. It seems strange that such should be the case when these are the things most people try hardest to avoid. The truth of the matter is that these things thrust the realities of life most vividly before us, and cause us to think most actively as we reach out most intently seeking ways of help. One who has had a similar experience or is struggling contemporaneously with it is most likely to join forces with us in the quest.

The American Vocational Association convention, coming as it does in December, emphasizes the importance of the bonds which exist among its members. These bonds are the result of many differences in point of view and practice being brought together from various parts of the country in the interest of the common cause. In a similar way the points of difference between vocational and general education can serve the entire cause best if made to correlate rather than clash with one another.

Farmers in the early days had few comforts or conveniences and often little or no money, but did have plenty of hardships and difficulties to face. No one thought to feel sorry for himself, but each helped the others by trading work until all the tasks of the countryside were completed. They worked together at plowing, planting, harvesting, and building barns. Each felt a security in the strength of his neighbors added to his own, and the ties of friendship bound the community together.

The nature, the size, and even the location of the community has changed today. Some may even think that as a place for mutual benefit it has disappeared. No one needs to go very far from his own door, however, to find people still who have serious problems, overwhelming troubles, and well-nigh unbearable suffering. The one who pauses to give assistance is the one whose soul is enlarged, and he contributes his bit toward binding the hearts of men together again even though ways of living have changed with the passing of years.

The transition from the primitive to the modern community has created new situations where people may learn to help solve one another's problems. The industrial shop, if properly planned and conducted, is full of problems. No boy may rightly expect to lean on another for the solution of his problems, but there is ample opportunity for observation here and there, and the interchange of thinking, figuring, planning, and trying until solutions are reached. Thus there is the same spirit of exchange which was practiced by the pioneers when work was the only available means. If properly utilized it can mean just as much in the lives of boys growing into manhood as it meant in the lives of men in those days.

We still have democracy because men struggled for the preservation of the things which bound them together. This same democracy is worth preserving and defending because it is built upon these proved values contributed by the individual. To insure its continuance we need to eradicate ignorance, mistrust, and hatred, and promote a higher degree of mutual helpfulness and understanding.

English clock, 17-18th century. Courtesy The Metropolitan Museum of Art

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

John J. Metz, Editor

AT THE YEAR'S END

The present issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION closes Volume 29, and it may be well to look back over the last ten numbers to see how much usable and valuable material the magazine has really carried to its readers.

For the past several years it has been customary to print the annual Index separately, but this year it again has been made an integral part of the December issue. It is easy for the reader, therefore, to scan through this Index to check some of the following statements.

An idea of what INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has furnished its readers may be obtained when one considers that 251 educators have contributed 308 articles with the hope of furthering professional progress. These authors hail from all parts of the United States, from United States Possessions, and from Canada.

Just as the cities in which the authors reside have a wide spread, so the articles which have been contributed have an exceedingly diversified cast.

As will be noticed the articles have been collected under numerous subject headings in the index. This arrangement will prove helpful to the reader who is looking for articles pertaining to specific types of material.

Instructors who are interested in project and course material to be used in their own shops, need but to look under such captions as aeronautics, arts and crafts, auto mechanics, birdhouses, boats, bookbinding, ceramics, drafting, electricity, foundry, linoleum-block cutting, machine shop, metalwork, printing, radio, sports, tracings, upholstery, and woodworking to find numerous suggestions and aids to make their own work more effective and meaningful.

Under the heading Bruce's School Shop Annual are collected a number of helpful shop layouts, courses, shop planning check lists, all of which may prove of great assistance to those confronted with problems of laying out shops and shop curriculums.

New ideas may be gained by the shop teacher interested in doing club work with his students, by scanning the contributions which have appeared during the year listed under the caption "Clubs."

Several articles of great value on the general shop concept are listed under the heading "General Shop." These, together with the projects listed under this heading, may prove helpful.

In the same way, assistance may be obtained from the articles listed under such captions as Bibliographies, Glossaries, Guidance, Illustrative Material, Industrial Arts, Instruction Sheets, Mottoes, Related Work, Research, Safety, School and Shop Utilities, Shop Kinks, Shop Management, Teaching Aids, and Vocational Education.

Many shop teachers, too, will want to look over the helpful suggestions embodied in the "Answers to Questions" which were given to queries asked by readers during the past year.

Then there are fourteen tests listed under the caption, "Tests and Testing." Many teachers have found these of great assistance in their work. If they do no more than to make instructors test conscious their inclusion in the volume, which is just coming to its close, will have been exceedingly useful.

Last, but by no means least, look over the list of authors who have contributed during 1940. You will find there the leaders in the profession, the hard-working shop teacher who is trying his best to make his work more perfect, the seasoned instructor who is altruistic enough to want to share his way of doing things with his fellow teachers, and the young dynamic shopman who is just trying to adapt the theories which he learned at college, to the practical situations arising in the schoolroom. All of these men, the well known as well as those who are just entering the field, have made a contribution to their fields and INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is very proud that it could be the vehicle which made it possible for this exchange of ideas.

THE A.V.A. CONVENTION

This year San Francisco is the city chosen for the A.V.A. Convention. This famous city has much to offer the visitor, but the A.V.A. Convention, December 16 to 18, will give it additional importance. The historic and romantic fascination which surrounds this number-one city of the West, no doubt is almost allurement enough, but the serious considerations which will engross those engaged in industrial arts and vocational education, all of whom are more or less involved if not perplexed by the rapidity of action, demanded by the training needs of the National Defense Program, give an intensified impetus to the need of deciding whether or not to attend this important convention. Lay your plans now so that you can attend.

COURTESY

It is practically understood that all teachers are to teach courtesy to their students. It is likely, too, that all teachers will severely criticize and sternly rebuke any breach of the rules of courtesy by the students in the classroom. All of this is commendable and as it should be, for courtesy is a mark of culture which all of our students should acquire.

It is unfortunate, then, to have teachers themselves forget that they, too, ought to practice courtesy. One needs only to attend conventions to observe that teachers think nothing of treating the speakers, whom they have invited to appear on their programs, with discourtesies which no teacher would allow to pass censure in his own classroom.

Recently at a convention gathering, a speaker had just finished his subject. The chairman arose to announce that questions were now in order. His voice, however, was entirely drowned out by the clatter and confusion created by those who had arisen preparatory to leaving the hall. After making several unavailing attempts to restore order, the meeting was adjourned.

Behavior of this kind might be excused at a political meeting attended by a group who had come for the avowed purpose of showing the speaker how it felt about his party or opinion, but this was a gathering of teachers, and the speaker was a leader in their field, and he had given them an able address and considerable food for thought.

This occurrence was no doubt due to thoughtlessness. There was no premeditated discourtesy intended. One may wonder, though, what that speaker, a man of national reputation, thought, not of the comparatively small group that caused the disturbance, but of the entire teacher association of which they were but a fractional part.

Terminal Engineering Courses For Trade Schools

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A noted engineer has said that the unpardonable sin in his field is inefficiency. If his statement is correct, then it is logical to assume that this standard should also be applied to the training of men contemplating engineering as a career.

One measure of the efficiency of a training process is to be found in the ability of those who have been through it; another measure, and, from the standpoint of educational efficiency, an important one, is to be found in the relation between the length of time students devote to their education and the benefits derived from it. The old problem of elimination is found in the engineering field as in other types of education.

Probably the most reliable statistics that throw light on the elimination of engineering students is furnished by Dr. W. E. Wickenden, President of Case School of Applied Science, who found that of 100 pupils enrolled as freshmen, 60 start the sophomore year, 42 the junior year, 33 the senior year, and 28 graduate. In other words, 72 out of 100 engineering students, for various reasons, fail to complete their courses.

The Seriousness of the Situation

The most serious aspect of this elimination is the fact that only 58 out of every 100 start the junior year. This situation is serious as the first two years of an engineering course are designed to prepare the student for the specialized vocational instruction of the junior and senior years. In fact, most universities have practically the same curriculum for the first two years of every field of engineering. Thus, the 58 out of every 100 beginning freshmen, who drop out at the end of the second year, have been preparing for a vocational training, not for a vocation. What happens to these 58 out of every 100 individuals is not exactly known. Many of them return home crushed by their failure and drift into other fields of work, making successes of various sorts, the kind and detail of which nobody as yet knows. Some of them undoubtedly drift into engineering itself and make some sort of success in that field. However, it may be said without fear of contradiction, that these eliminated individuals would have received more efficient education from their two years of college training if they had pursued a course, not designed to prepare them for further education, but designed to make it possible for them to enter the engineering field at the end of the two-year period. Society, then, could expect to receive from their services a return that would be more commensurate with the money which it so freely spent on them.

Serious as is this wasteful method of expending funds on education of this sort for the eliminated, more tragic is the inefficient and wasteful use of the time of the student in a period of life when young men's destinies are influenced by incidents, and elimination is an important incident. A course designed to terminate at the end of a two-year college career would place this large group in possession of abilities that are salable over the industrial counter. This then indicates the meaning of the expression "terminal courses."

Terminal Junior-Engineering Courses

Terminal courses are not new. The writer has not conducted any research to determine the institution that first started them, but it is common knowledge that many private schools and junior colleges have been offering them for several years. Pratt Institute, Brooklyn; Wentworth Mechanics Institute, Boston; Rochester Mechanics Institute, Rochester; Ohio Mechanics Institute, Cincinnati; and several junior colleges in California, are all offering such courses.

For some reason public educational institutions, which include trade schools, junior colleges, and state colleges, have been slow in offering two-year terminal courses in engineering. Many junior colleges for some time have included an "engineering curriculum" in their offerings, but the content of the great majority of these courses is identical with the preparatory first two years of a standard four-year engineering course, and it is expected that the graduates will continue and not terminate their education. These courses are, therefore, not terminal in nature and the probabilities are that no greater percentage of the junior-college graduates enter the junior year in another school, than the sophomores of four-year engineering school continue their schooling into the junior year.

Since public educational institutions are usually intent on solving educational problems, the scarcity of terminal courses can be explained by an absence of information relative to the situation. In fact, until the attention given the problem by the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education, few recognized that there was a need for technical men trained in the way of the junior engineer.

The Demand for Junior Engineers

If this had been written ten years ago, the statement could have been made that there was a great demand for junior engineers. Now one cannot make this statement about any group of trained men. It is known, however, that this demand is a proportional part of that for engineers trained in the four-year curriculum.

Upon investigation in the state of New Jersey to determine the engineering service needs of 45 large manufacturing corporations employing many thousands of men, it was shown that they preferred the junior engineer in 2.8 times as many engineering positions as the senior engineer. Another survey of 21 large manufacturing corporations by the Engineering Dean of Rutgers University showed junior engineers desired in 2.7 times as many positions as senior engineers. Two more similar studies, one made by a large public-utility organization, and the other by a private individual in California, showed figures of 2.7 and 2.6 respectively. The unusual mathematical similarity between the ratio of junior engineers desired to senior engineers in all four of these studies is rather significant. It certainly indicates that there should be more than twice as many junior engineers graduating from terminal junior-engineering courses, as senior engineers graduating from four-year courses.

The true figures are pitifully short of this amount. In fact, the situation is reversed. There are many, many more four-year graduates presenting themselves for employment each June than two-year engineering graduates. Dr. Wickenden, mentioned previously, has made the most thorough study of this phase of the problem and has estimated that when business conditions are normal a total of 30,000 junior-engineering graduates are needed each year. This number is many more times greater than the number of young men now being trained. He concludes "that the potential fields for employment of technical-institute graduates appears to be limited only by the source and facilities to train them and the right kind of men to be trained." Surely, there is no more fertile field for the planting of educational seed.

Upgrading of Occupations

Education seems to demand education. More education seems to give society, through research and engineering, more comforts, more enjoyable things, more tools, and a wider range of action; in other words, more livable living. In turn, the servants of society, the workers that pro-

duce these increased values, must have more education, the better to render their services in our array of specialized occupational activities.

This situation, perhaps, partially accounts for the general increase in educational levels acquired by our people. A generation ago a high school education sufficed adequately for a successful career and college graduates were scarce. Today a college education is commonplace and Ph.D.'s are no longer considered rarities.

Some of the opportunities for this "in between" technical worker may be the result of some occupations moving up from the high school level into the lower-college level. Mr. G. V. Bennett, Associate Professor of Education at the University of Southern California, asked a group of 50 competent people to express their opinion regarding the training required by the members of a long list of occupations. To illustrate the upgrading of occupations as found by his survey, the following may be listed, which up to now, have seldom been associated with the college level: auto salesman, bank teller, cafe manager, detective, hotelkeeper, interior decorator, linotypist, printer, radio operator, railroad station agent, railroad mail clerk, traveling salesman, X-ray operator, watchmaker, photographer.

After witnessing this strange elevation of occupations, is it any wonder that industry and business has many new technical positions for men whose training requires the college type of education? Their insistence on a larger portion of the workers trained in the way of the junior engineer is the only logical outcome of the increased application of science and engineering to all phases of industry and business.

One other explanation of the shift upward in educational requirements for certain occupations is undoubtedly in the very marked higher entering age for employment. Society is shortening the work span of life, lowering the upper limit, and raising the lower limit. Apparently people in the upper age brackets are to be served by the pension system, and youth in the lower are to be served by educational opportunities not enjoyed by any other generation. Since there is plenty of time to devote to the educational process, it is to be expected that all persons, upon entry into an occupation, will have more of it.

An Opportunity for Trade Schools

This recent creation of a new type of junior technical worker came so suddenly that few engineering educators were aware of it until it was upon them. To date we have had little response from the engineering university. Every opinion that has been heard on the subject is to the effect that we cannot look to the large university, state or private, to supply this form of occupational training. These institutions have their own professional-occupational training problems that are absorbing their attention and their facilities have been strained to the limit by increased enrollments. Some investigators believe that the junior college, except the larger ones, living of necessity in the traditional college atmosphere, will not be able to appreciate the requirements and satisfactorily meet them. The merits of a state-supported vocational training system organized as it is, or was, in Europe are advanced by many. It does not matter where the responsibility for this training is placed, so long as some system of education does something about it.

Junior-engineering training fortunately is free from standards designed to insure adequate preparation for further education. The only standards and requirements are set by industry which demands only that the graduates make good. For this reason, a college junior-engineering course may be easily incorporated in any kind of an existing educational institution. This fact should be of interest to the trade schools. The average trade school is in possession of a faculty adequately prepared to teach junior-engineering courses and, with the expenditure of a moderate sum of money, should be able to add enough equipment to that already in use to insure a satisfactory physical setup for splendid courses in junior engineering.

The curriculum problem should be easily solved for the technique of trade analysis is the one to use in the selection of the subjects to be taught and in the determination of content material. No one will stand by to specify the details of the organization or to pass on the nature of the credits earned by the students. Success of the program will be assured if the students make good, and censure will be forthcoming if they do not. The test is a practical one, and not academic.

The Cost of These Courses

The cost must not be forgotten. But there is no reason why it should be any higher than the cost of training in any other vocational field as subsidy can now be obtained. Previous to July 1, 1937, this form of training was usually ineligible for federal aid under the Smith-Hughes Act as the act prohibits aid for work of "college grade." Now terminal courses above the secondary school level are not of college grade if:

1. College entrance requirements are not necessary for admission.
2. The objectives of the training program is to prepare for advantageous employment in industry.
3. The training program does not lead to a degree.
4. The program is not required to conform to conditions governing a regular college course.
5. The instructors of both shop and related subjects meet all the provisions of the state plans as to qualifications.

In dealing with the local problems, the hardest one to solve will relate to the knowledge of the public and prospective students as to the nature of this new form of college training. The American public through the years has become thoroughly acquainted with the present three-step system — grade school — high school — college. Anything short of four years of college training is to them a consecutive step in between a high school diploma and a college degree. Few can think of a shortened college course ending in a final jump into an occupational career. It is hard to show that it is possible to locate the end point at any college level. Therefore, when the terminal nature of these junior-engineering courses is explained, the purpose and the real meaning of the program is often misunderstood.

Because of a thoroughly indoctrinated idea that all schoolwork of any value must be *accredited* some students are afraid to venture into these courses. Since the subjects do not fit any of their curriculums, no university will accept a graduate of a two-year engineering course as a junior classman. I doubt that in America there ever will be a path between the junior-engineering curriculum and the university. Some students also feel, should they find themselves able upon the completion of a two-year terminal course to continue their education, that the time spent in the shortened curriculum is wasted. This situation increases the importance of adequate and unmistakable information for the purpose of guidance. There is a fork in the educational road at this point that necessitates a final decision. One leads to the junior occupations; the other, to the professional. However, as pointed out in the early part of this discussion, the choice of the professional road, if untraveled its entire length, can be disappointing. The danger of inadequate guidance, then, cannot be advanced as an argument against the junior-engineering curriculum, for wherever this defect exists, educational results are sure to be wasteful.

The terminal courses will probably have to struggle for some time against these odds until the public finally understands the educational principles relating to them, and into their conception of our educational system fit the new institution that will administer them. The future is bright, however, for history has shown that new or extended education, based on sound principles, is always supported by the American people, and still more encouraging is the attitude of the American educational institutions toward educational needs. They have never failed to provide for them. Here lies the opportunity for the American trade school.

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Properties, Selection, and Suitability of Woods for Woodworking

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Wise selection of wood for woodworking entails, first of all, the determination of the requirements of that use. These requirements vary with the quality of the articles produced and the conditions to which the articles will be subjected in service. The wood best adapted to a given use will, therefore, not always be the same. Ash and southern yellow pine furnish an example of widely different woods used successfully for the same article. Ash is used for bats for college, semiprofessional, and professional ball players. Southern yellow pine serves equally well as ash for bats for small boys of the grade-school age because for children's bats the strength and toughness requirements are not so high. The necessity for careful observation is illustrated in a mistake commonly made in selecting wood for diving boards. Decay-resistant woods are often selected because of the wetting to which the boards are subjected. Diving boards, however, usually fail mechanically in less than two years if they are subjected to continuous use, such as at popular public beaches. The selection of a comparatively high-priced, weak wood of high decay resistance for diving boards in preference to a low-priced strong wood of moderate or low decay resistance, as is often done, is obviously wasteful, because the purchaser is paying for decay resistance, a property of little or no importance to the use requirement.

After the requirements of use are determined it is relatively easy to check the properties of the different woods to see whether these requirements would be met. Wood for the exposed parts of most articles must be sufficiently hard to resist denting in ordinary usage. Many woods are strong enough and possess other qualities which would fit them for use in exposed parts of such articles as furniture but are barred for lack of the required hardness. Butternut is a good example of such a wood. On the other hand, the wood must not be too hard, or it will be too difficult to work.

Wood, which has the requisite hardness, also is sufficiently strong not to break in handling or in use, unless weakened by defects. On the other hand, numerous woods like basswood, cottonwood, chestnut, or willow, are not only too soft but too weak (unless used in comparatively large sizes) for the substantial parts of high-grade furniture. Even the stronger woods, such as oak and walnut, fail occasionally in use because of cross grain, decay, or too deep carving or mortising.

*Maintained in cooperation with the University of Wisconsin.

Good appearance is required in wood used for most kinds of woodworking. Many woods which otherwise would be suitable for high-class woodworking have not a sufficiently attractive figure or color to make them desirable.

Comparative freedom from warping and from excessive shrinking and swelling is essential in woods used in woodworking. The enviable reputations of mahogany and walnut are due in part to this characteristic, and the usual preference of quarter-sawed to plain-sawed lumber is based on the common experience that the quarter-sawed warps less. Changes in the dimensions of wood cannot, however, be avoided entirely. As a general rule, the heavier and harder species shrink more than the lighter and softer ones.

The fashioning of wood at the proper dryness means practically no serious shrinkage later. Wood at the time of working should therefore be seasoned to about the average moisture content that it will have in service. Proper seasoning does not necessarily mean that the lumber shall stand in piles air drying for a given number of years, but simply that it shall be dried to a proper and uniform moisture content and be free from seasoning defects and internal stresses. In the seasoning of wood the modern lumber manufacturer, with his closely regulated dry kilns, has a distinct advantage over the old-time cabinetmaker, who had no such equipment and therefore often turned out a product which shrank, warped, or checked in use.

To work easily, glue without much difficulty, and finish well also are important from the woodworker's standpoint.

Resistance to decay is not an important factor in the selection of wood to be made up into household articles, since practically all such articles in use are too dry to be subject to decay. In fact, maple, birch, gum, and other woods which rank low in durability in damp locations are used extensively and with good results in household articles.

Appearance, style, and finishing qualities are the properties dominating the selection of woods for furniture. Ability to stay in place, nonsplitting, and good-holding power for screws and nails are important requirements for woods used in concealed parts of furniture. Although the shifts from one wood to another in furniture are practically unpredictable from year to year, nevertheless large quantities of red gum, yellow poplar, maple, chestnut, and tupelo go into furniture every year.

It is not often that one property alone controls the choice of wood for a given article. Usually it is the degree to which two or more properties are combined. Before the user can find the combination he needs for his specific purpose he must be prepared to think in terms of specific and individual properties.

In the following paragraphs the various woods are classified into three broad groups according to several important properties.

The classification is based principally upon factual data obtained at the Forest Products Laboratory. No attempt has been made to draw fine distinctions between woods. Neither is it to be inferred that all woods in the same class are equally suitable.

The classification assumes equal size, equal dryness, and for strength properties, equal freedom from knots and the like, as between the different kinds of wood. So far as size is concerned, in actual practice all the different kinds of softwood lumber are governed by the same standards. However, some woods, mostly eastern hemlock, eastern spruce, and northern white pine, and some southern yellow pine, are commonly cut one thirty-second of an inch fuller than the general standard for 1-in. lumber. Where such oversized lumber is also dry at the time of dressing so that subsequent shrinkage does not reduce the thickness, there is, of course, an advantage in the strength due to oversize, and the classification as given does not apply without modification. On the other hand, some boards of some woods are sold substandard, that is, three thirty-seconds of an inch under and some dimension material one-sixteenth of an inch under the standard thickness. Such differences must be taken into account in comparing the strength of species where strength is really important.

In actual practice different shipments of the same kind of lumber vary rather widely in dryness according to the source of the lumber. Some kinds of lumber run consistently drier than others because of the ease of seasoning the wood. A difference of one thirty-second of an inch in the thickness of boards and one-sixteenth of an inch in the thickness of dimension may exist due to difference in dryness at time of dressing. Regardless of the cause the fact stands out that a slight increase in size may easily compensate for inherently lower strength properties.

Hardwoods in some of their properties and uses differ substantially from softwoods. As a class they are heavier, harder, shrink more, and are tougher than the softwoods. Hardwoods and softwoods are very similar in stiffness, which means that reduced to a weight-for-weight basis the softwoods are much stiffer. In strength as a post, that is, the compressive strength endwise, and in bending strength the two groups are more directly comparable than they are in weight, toughness, and hardness, but there are more of the commercial hardwoods than of the commercial softwoods that can be rated high in bending strength. The softwoods are used principally in construction work, whereas hardwoods furnish most of the wood for implements, furniture, and other industrial uses.

Hardness

Hardness is the property that makes a surface difficult to dent, scratch, or cut. See Figure 1. The harder the wood, other things being equal, the better it resists wear, the less it crushes or mashes under loads, and the better it can be polished; on the other hand, the more difficult it is to cut with tools, the harder it is to nail, and the more liable it is to split in nailing. Hardness is a property that one seeks in such uses as flooring, furniture, and tool handles.

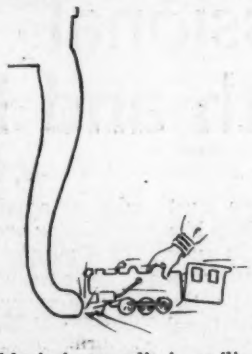


Fig. 1. Hardness is a necessary quality in woods used for furniture

There is a pronounced difference in hardness between the springwood and the summerwood of some woods, such as southern yellow pine and Douglas fir. In these woods the summerwood is the denser, darker-colored portion of the annual-growth ring. In such woods differences in surface hardness occur at close intervals on a piece, depending on whether springwood or summerwood is encountered. In woods like maple, which do not have pronounced springwood and summerwood, the hardness of the surface is quite uniform.

The classification of a species as a hardwood or softwood is not based on actual hardness of wood. Technically, softwoods are those cut from coniferous or evergreen trees, whereas hardwoods are those cut from broad-leaved or deciduous trees. Actually, some of the softwoods are harder than some of the hardwoods, and conversely.

The strong position that a number of woods hold among carpenters for building purposes is due in part to their softness and uniformity rather than to their hardness. Northern white pine, yellow poplar, and basswood are traditional examples. The ease with which these and other woods, such as ponderosa pine, sugar pine, and western white pine, can be cut, sawed, and nailed has put them in a high position for general use, and particularly for uses involving considerable working with machine and hand-cutting tools. It is generally recognized that differences among woods in the matter of hardness are sufficiently great to have an important bearing on the choice of woods for such uses as flooring and furniture, on one hand, and for siding, millwork, and cabinets, on the other.

Table of Relative Hardness

High	*Intermediate*	*Low*
Ash, black	Chestnut	Basswood
Ash, white	Cypress, southern	Butternut
Beech	Douglas fir	Cedar, northern white
Birch, yellow	Gum, red	Cedar, southern white
Cedar, eastern red	Hemlock, eastern	Cedar, western red
Cherry	Hemlock, western	Cottonwood
Elm, rock	Redwood	Fir, balsam
Elm, soft		Fir, white
Hackberry		Pine, northern white
Hickory, pecan		Pine, ponderosa
Hickory, true		Pine, sugar
Larch, western		Pine, western white
Locust, black		Poplar, yellow
Locust, honey		Spruce, eastern
Maple, hard		Spruce, Engelmann
Maple, soft		Spruce, Sitka
Oak, red		
Oak, white		
Pine, southern yellow		
Sycamore		
Tupelo		
Walnut		

Weight

Weight, in addition to being important in itself, is a reliable index of the strength properties of dry wood when the degree of dryness and actual sizes are the same. A heavy piece of dry wood is stronger, as a rule, than one lighter in weight whether of the same or of a different species.

Table of Comparative Weights

High	*Intermediate*	*Low*
Ash, white	Ash, black	Basswood
Beech	Cherry	Cedar, northern white
Birch, yellow	Chestnut	Cedar, southern white
Cedar, eastern red	Cottonwood	Cedar, western red
Elm, rock	Cypress, southern	Fir, balsam
Elm, soft	Douglas fir	Fir, white
Hackberry	Gum, red	Pine, northern white
Hickory, pecan	Hemlock, eastern	Pine, sugar
Hickory, true	Hemlock, western	Spruce, Engelmann
Larch, western	Pine, ponderosa	
Locust, black	Pine, western white	
Locust, honey	Poplar, yellow	
Maple, hard	Redwood	
Maple, soft	Spruce, eastern	
Oak, red	Spruce, Sitka	
Oak, white		
Pine, southern yellow		
Sycamore		
Tupelo		
Walnut		

Weights as commonly expressed are either the weight of the wood in the green condition or its weight in the air-dry condition. The former is its weight when cut from the living tree; the latter is the weight at which the lumber is best suited for use under the average outdoor conditions in the United States. The classification given here is based on the air-dry condition.

Freedom from Shrinkage and Swelling

Most materials change in dimension with changes in temperature or moisture. In the case of wood, the thermal expansion is so small as to be unimportant in ordinary usage. Wood, like many other fibrous materials, shrinks as it dries and swells as it absorbs moisture. As a rule, however, much of the shrinking and swelling of wood in service is unnecessary and can be avoided by using wood that has been dried to the right moisture content.

In all kinds of wood the shrinkage or swelling in the width of a flat-grained board is nearly twice that of a quarter-sawn or edge-grained board of the same width. See Figure 2. Edge-grained or quarter-sawn wood of a species having high shrinkage will therefore prove as satisfactory as flat-grain stock of the kinds with inherently lower shrinkage. Wood has practically no shrinkage or swelling lengthwise of the grain.

The classification according to the amount of freedom from shrinkage as given in the table does not tell the user the whole story of the shrinking and swelling of different species in service. About half of the shrinkage is "taken out" of wood in thorough air seasoning and about two thirds in thorough kiln drying. The taking out of the shrinkage in the foregoing amounts is sufficient for the ordinary uses to which wood is put. Of course, the shrinkage does not stay out when moisture is reabsorbed, but the important thing is to have it taken out at the time the wood is built into a structure. The rate at which drying and shrinkage occur in different kinds of wood is very important in practical usage. A wood that has a relatively low total shrinkage, may dry so slowly, that in actual practice, it commonly gets into use before the proper amount of shrinkage has been taken out. Individual pieces of some woods, such as western larch, southern cypress, and redwood, frequently are slow to dry and therefore slow to shrink to their ultimate condition. Such pieces are liable to give a greater amount of trouble from shrinkage than the actual shrinkage value for the species indicate. This is a condition that can be controlled by making sure that such woods are thoroughly and uniformly dry prior to use. Ponderosa pine, sugar pine, northern white pine, western white pine, and the cedars give up their moisture quite readily and uniformly, and the chances of encountering shrinkage difficulties with such wood are correspondingly minimized.

The means of determining whether wood is dry enough for use, will be discussed later.

(To be continued)

Table of Comparative Freedom from Shrinkage and Swelling

High	*Intermediate*	*Low*
Cedar, eastern red	Ash, white	Ash, black
Cedar, northern white	Cherry	Basswood
Cedar, southern white	Chestnut	Beech
Cedar, western red	Cypress, southern	Birch, yellow
Pine, northern white	Douglas fir	Cottonwood
Pine, sugar	Fir, balsam	Elm, rock
Redwood	Fir, white	Elm, soft
	Hemlock, eastern	Gum, red
	Hemlock, western	Hackberry
	Larch, western	Hickory, pecan
	Locust, black	Hickory, true
	Locust, honey	Maple, hard
	Maple, soft	Oak, red
	Pine, ponderosa	Oak, white
	Pine, southern yellow	Sycamore
	Pine, western white	
	Poplar, yellow	
	Spruce, eastern	
	Spruce, Engelmann	
	Spruce, Sitka	
	Tupelo	
	Walnut	

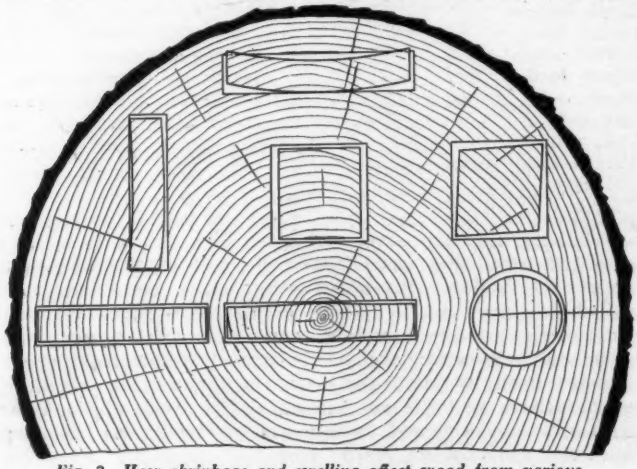


Fig. 2. How shrinkage and swelling affect wood from various parts of the log

A Philosophy of Professional Growth and Progress

THEODORE L. NIEMAN

Manual Training High School, Peoria, Illinois

It is probable that there has never been a time when the industrial-arts teacher has been provided with the incentive for self-improvement that he has today. The amazing projection of industrial arts into the foreground of education has brought the instructor into the dazzling light of prominence — a position never accorded him in the early manual-training setup, when he was a *special* teacher, set apart from the teachers of the so-called cultural subjects.

The instructor of industrial arts must not allow his subject to run away from him — to advance faster than he does. In order to keep pace with its growth, he must grow along with it through professional activity, intellectual activity, and educational activity.

Through professional activity, he will demonstrate his interest in his field of endeavor. Through intellectual activity, he will follow the trends of all education and specifically his own subject, and have a new consciousness of change. Through educational activity, he will add to his knowledge and acquire new degrees of proficiency in learning and teaching and will augment the dignity of his profession.

Each teacher must evolve a philosophy of professional improvement of his own, which will enable him to hold his new social position in the educational scheme. For this reason, the writer has chosen to formulate a philosophy of professional growth and progress, with a view to illustrating what unlimited possibilities there are for the industrial-arts teacher to justify his newly acquired prestige in the teaching profession.

Professional Activity

The new industrial-arts teacher will re-evaluate his opportunities for professional activity. There are certain definite values to be derived from all forms of such activity. If such values have not been recognized and appreciated by the industrial-arts instructor in the past, the consciousness of his new relation to education should stimulate him to seek out and take advantage of every chance to function in a professional capacity.

Local industrial-arts clubs should be injected with new life as a result of new ideas and ideals of achievement. There is no better place for a live industrial-arts teacher to keep in close contact with professional men of his own community, and to interchange new ideas and plans, than in these local clubs if they are functioning properly. And if the programs of former years have been more or less cut and dried and of little interest, what a challenge to the instructor who has received the new vision to so influence his organization that it will start going in the right direction!

The industrial-arts teacher who is the most efficient and who has the interests of his work most at heart will be found professionally active in civic affairs. He will consider it his duty to contact various luncheon clubs, taxpayers' associations, and administrative groups, in order to keep them informed as to the function of industrial arts and to enlist their support in the program of enlarging the field.

"The deserving and developing teacher is a tireless reader of general and professional literature."[1] The industrial-arts teacher of tomorrow will certainly do more than merely subscribe to professional and educational magazines. His growth and development in his field and in education as a whole will be seriously stunted if he does not make it a practice to expose himself to the written ideas of others in the same profession.

The advantages of conscientious participation in county institutes and high-school conferences are obviously numerous. The proper utilization of visiting days is a great factor in enlarging the viewpoint and in bringing a feeling of personal acquaintance and relationship among instructors of different communities. The progressive instructor will profit immeasurably by these opportunities which are afforded him.

There is still another important phase of professional activity — that being known as extracurricular activity. The instructor who is teaching for the love of his subject and of his association with youth will not end his day's work when the last bell rings. He will foster the spirit of craftsmanship through hobby clubs, or by aligning himself with the more recent Future Craftsmen of America organization, to carry the teachings and principles of industrial arts into after-school hours as leisure-time activity.

[1]Champlin, Carroll D., "A Philosophy of Personal and Professional Improvement for Teachers and Students of Education," *Educ. Mag.* 43:71. Oct., 1922.

Intellectual Activity

The intellectually active instructor will never allow himself to fall into a teaching rut. He will be aware of changes and be willing to accept them if they further the cause of education. He will be forward looking to the extent that he will be familiar with trends of economic, social, technical, and cultural progress, and able to anticipate and prepare for changes which affect his own field.

The changes which have a direct bearing upon his work are changes in population, enlarged enrollment in school, changes in types of students with whom he must deal, technical and industrial changes involving new techniques and skills, and changes which must be made in the curriculum to meet new demands.

The instructor of the revised industrial-arts course will adapt himself to the changes which he must make and will prepare himself to administer them well. There will be more tests to determine progress and achievement of students which will also be summarized and interpreted in such a way that the instructor may evaluate his own work and profit by the results in being able to adjust his course to more nearly reach his goal. The word "objectives" will be a familiar and understood term in the vocabulary of the intellectually active instructor.

He will make provisions for the correlation or integration of all the subjects in the curriculum, insofar as each is possible and practicable. He will introduce into his industrial-arts course the use of texts and references and will encourage outside reading and reports on related subjects. He will recognize the benefits to be derived from visual aids in teaching. Whenever possible, shops will be organized in such a way that students may actually participate in their operation by means of the foremanship plan, or at least by some type of division of responsibility. He will devise and perfect a new and more accurate system of grading which will more nearly evaluate the achievement or progress made by the students.

Any teacher who expects to develop intellectually will stop at fairly regular intervals and scrutinize himself. A little self-analysis goes a long way toward correcting habits which retard professional growth. Aside from being excellent as a form of mental gymnastics, self-evaluation does wonders toward diminishing egotism and humanizing a teacher by making him more understanding and sympathetic toward the faults and peculiarities of those with whom he must work. This checkover should be thorough and should include such points as: personality, viewpoint, interest in and participation in community problems, personal professional standards, possible improvements in teaching, attitude of cooperation, willingness to take and follow instructions, and mannerisms of speech, facial expression, and posture which detract from his teaching. The instructor who is really growing will rate himself as honestly as he does his students and will profit accordingly.

The instructor who is mentally alert and intellectually active will keep his mind flexible and open to changes which mean improvement in either himself or his work. He will formulate a new philosophy of industrial arts to meet the new conditions which are bound to arise in a period of transition.

Educational Activity

The writer has selected two quotations from Carroll D. Champlin's philosophy, which, in brief form, incorporate the whole philosophy of educational activity for professional progress. "Those who have ceased to learn will soon be unable to help others learn," and "the truly aspiring soul will never withdraw his matriculation card from the university of experience."[2]

The trend toward the elevation of educational standards continues, and the progressive teacher finds that the training he was given ten or twenty years ago is inadequate in the present scheme. Every year there are more institutions offering graduate work in industrial arts and every year more teachers are enrolled in such courses.

Educational growth is greatly stimulated by the contacts made with the progressive type of teachers who are doing graduate work, and with the leaders in the field of industrial education.

The industrial-arts teacher who is preparing himself educationally for the future has a variety of needs. He not only needs instruction in his major line of work, but he also needs courses in psychology and mental hygiene, sociology, and economics, since the work of the industrial-arts instructor-to-be will require such knowledge.

He will especially need training which will enable him to deal wisely with the problem of the adolescent boy. The comparatively new problem of guidance has been assigned to the industrial-arts department, since it is generally felt that the industrial-arts teacher is best able to undertake it due to the pleasant and informal nature of the work and the close companionship of the instructor and student. Thus to the old-fashioned, manual-training department comes the latest word in educational trends, bringing new responsibilities to the instructor and the necessity for him to add to his training, the fundamentals of psychology.

The industrial-arts teacher will accept the challenge of the new status of industrial arts in education. He will be a new type of teacher who has a broader outlook on educational affairs. He will be professionally, intellectually, and educationally active, in order to elevate himself to the new position of professional dignity and prestige which is now being accorded to him.

[2]Champlin, Carroll D., "A Philosophy of Personal and Professional Improvement for Teachers and Students of Education," *Educ. Mag.* 43:71. Oct., 1922.

Problems and Projects

LIGHTING THE CHRISTMAS TREE

O. Arnold Radtke,
Peckham Junior High School,
Milwaukee, Wisconsin

The Christmas season will soon be here and the shop teacher will probably be called upon to decorate and light the school tree. A most pleasing effect can be produced with spotlights and ornaments cut from tin cans and old aluminum kettles. The more varied the shape of these decorations the more enchanting will be the effect.

Polish the aluminum till fairly bright and shiny. Cut into as many different shapes as possible. Some long and narrow, some square, some star shaped, others round, some diamond shaped, and still others in the form of spirals. Twist long strips one or two turns. Cut the squares from the corners toward the center. then turn up the corners to form a ball. Open the spirals to form a coil, support them from their centers, and hang them on the tree.

The lighting is done with five spotlights. having red, blue, and green color mats. The blue spots are centered one on each side above and a little toward the front of the tree. The green spots are placed on the floor, about five feet or a little more in front and to the side of the tree. The red spot is so suspended that the light will fall on the front of the tree down the center. The green lights may be hidden by wallboard cut to resemble bushes. The ornaments will reflect the blue lights from the upper sides, the green from the underside, and the red down the front making a most pleasing effect. If the stage is equipped with dimmers, the effect may be made still more alluring. The lights may then be brought up slowly either one color at a time or all together. The auditorium should be darkened during the tree lighting.

This form of tree lighting is safe, cheap, and very effective.

DESK CLOCKCASE

Don L. Olson,
High School,
Dawson, Minnesota

1. Glue up material to the approximate dimensions. This project requires pieces of 2 by 2 by 8 in. glued together as shown in Figure 1.

2. Plane and square carefully after removing the pieces from the clamps.

3. Lay out the curve, as shown in Figure 2, and cut off the top; save the top piece, however.

Fig. 1. Gluing up the stock

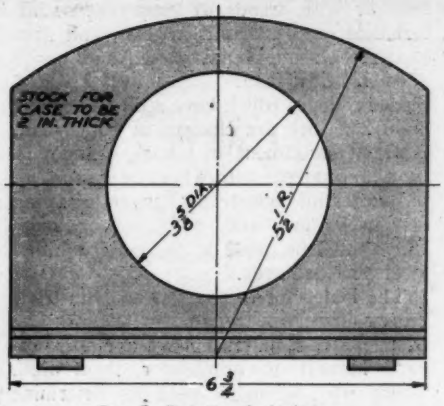


Fig. 2. Details of clockcase

4. Cut a piece of veneer (1/28 in.) to approximate size of the top piece.

5. Glue on the top piece of veneer, using No. 2 White Casco only on the case (not on the veneer). A sheet of paper must be inserted between the caul and the veneer. Use the piece cut from the top for the caul. See Figure 3.

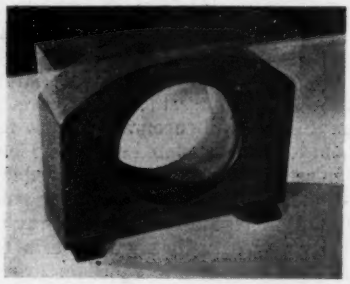


Fig. 3. Gluing on the top veneer, using the piece that was cut off the top, as a caul

6. Clamp securely, and allow the job to dry for about 12 hours.

7. Trim the veneer on top, then glue on the two sides, overlapping the top.

8. After the glue has dried, trim the edges and glue veneer on the face. Use caul and apply center clamp first to force out any glue, then apply two other hand screws. Don't forget the piece of paper between the caul and the veneer each time.

9. Cut a groove for the inlay, using a circular saw, or cut the groove with a piece of old hack-saw blade cut down to the same size as the inlay, as described by Mr. Hjorth in his "Principles of Woodworking."*

10. Put glue only in the groove and clamp the inlay in place. Let dry thoroughly before sanding. If sanded too soon after gluing. shrinking is inevitable and the inlay strip will appear shrunken.

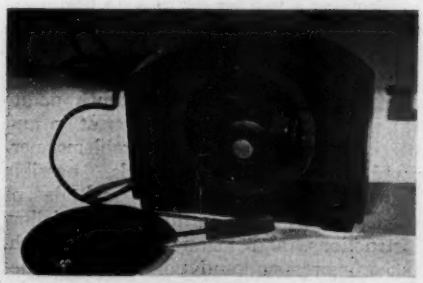


Fig. 4. Placing the clock into the case

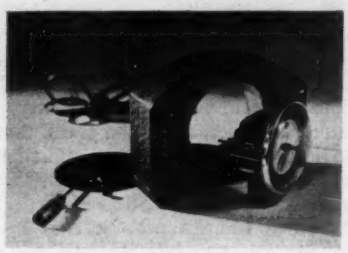


Fig. 5

11. Now fasten to the lathe faceplate and cut through from the front, until about to hit the screws from the faceplate. Remove and finish by boring a hole and cutting the rest out with a coping saw, or a jig saw that will handle work 2 in. thick.

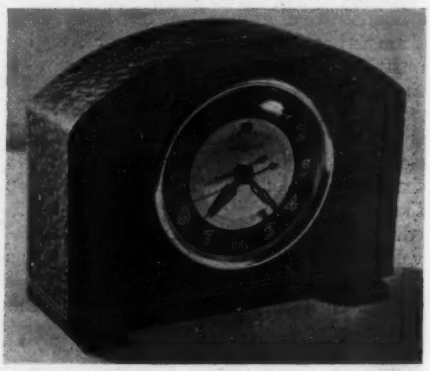


Fig. 6. The finished clock

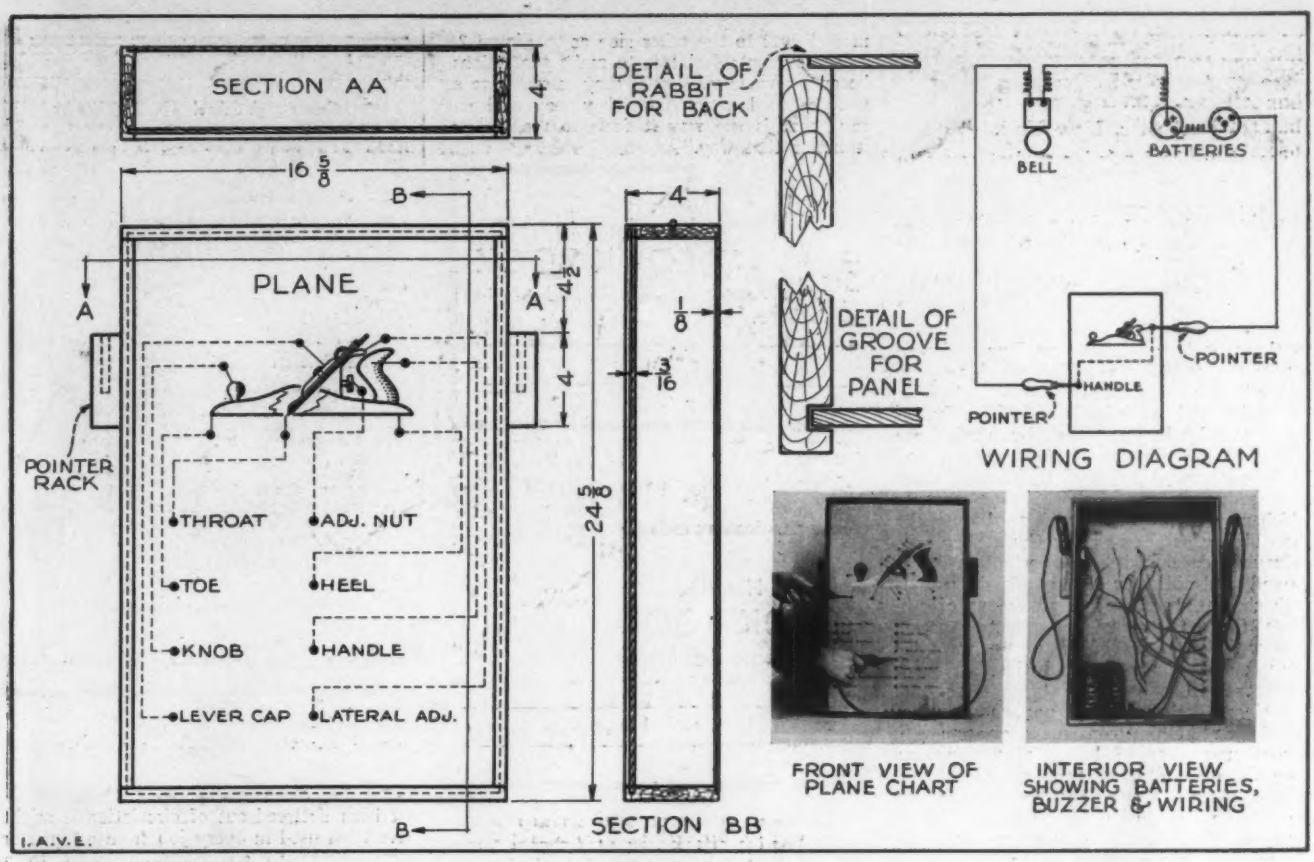
*Published by the Bruce Publishing Co., Milwaukee. Wis.

ELECTRIC WOODWORKING TEST CHARTS

Joseph B. Kelley,
Paul Hoffman Junior High School,
New York City

One of the most interesting learning devices from the youngsters' viewpoint, and a very good teaching device from the teacher's point of view, is the electric chart illustrated in this article.

This chart has been in use for a number of years in the woodworking shop of The Paul Hoffman Junior High School of which Mr. Angelo Patri is principal. One of the assets of the chart is that youngsters learn the various lessons of their own accord by *playing the game* as they call it. They delight in finding the answers and testing their knowledge on



Electric woodworking chart

one another. The play instinct and spirit of competition are brought to the fore and this helps to stimulate interest in knowing the parts of the various tools and other lessons illustrated by the various panels used.

The chart itself is based on the simple method of wiring a single doorbell and push button. The cabinet is built around a three-ply veneer panel 3/16 by 16 by 24 in. The cabinet illustrated permits the use of any desirable number of panels, all using the same set of electrical parts. Panels can be made up on the name of the parts of the various tools, various kinds of wood joints, types of supplies used in the shop, kinds and grades of sandpaper, and the like.

The sides, top, and bottom are grooved to permit the panels to slide in and out, the top being made of two pieces, one permanent and the other hinged to allow access to the panels. The back of the cabinet is set in a rabbet and fastened with screws or nails. To repair any part of the electrical device it is only necessary to remove the panel. The back can be almost any thin material either plywood, prestwood, or other composition material.

For the contact points which show on the face of the panel, one may use hollow ground rivets, soldering the wire in the holes in the rivets. Copper nails also may be used, the wire being soldered to them. In place of a bell, a buzzer or small electric light may be used, and in place of batteries one may use a transformer. The pointers consist of wooden handles through which are fastened pieces of steel or iron wire, the outer ends of which are sharpened like a pencil, and to the other which are soldered the ends of electric wire. The pointers may be hung on a hook or in pointer racks which are pieces of 1¼ by 1¼ by 4 in. wood drilled to receive the pointer and fastened to the sides of the cabinet.

For visual education in the shop, the instructor will find that he will be repaid many times over for the small amount of time and effort required in constructing the chart.

Electric Chart
Bill of Material

		T	*W*	*L*	*Description*
1	pc.	3/16"	16"	24"	Panel
2	pc.	9/16"	2"	16⅝"	Top
1	pc.	9/16"	4"	16⅝"	Bottom
2	pc.	9/16"	4"	24⅝"	Sides
1	pc.	⅛"	16"	24"	Back
2	pc.	1¼"	1¼"	4"	Pointer Racks
2	pc.	½ x ¾"	Butt hinges		For top
1	Bell, buzzer, or small electric light.				
2	1½ volt dry-cell batteries, or — transformer.				
2	pointers.				
	The necessary wire for connecting rivets.				
	The necessary rivets for contact points.				

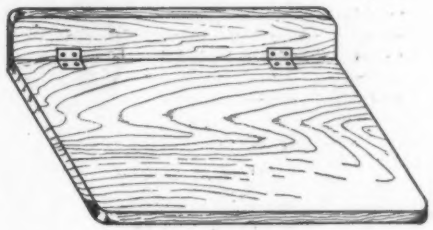
PRESS FEEDER'S SAFETY DEVICE

Chester L. Bond,
Alhambra, California

Several years ago a boy had an accident in my shop when he reached for a sheet of paper that he had dropped between the platen and the delivery table as he was taking the sheet from the press. His hand was not badly injured because the back of the delivery board broke leaving more room for his hand than there otherwise would have been.

When replacing the board, I fastened it with a pair of small hinges costing only ten cents. These allow the back to fold over in case some other boy should be caught in the same way. It has saved several hands since that time.

Of course, boys should be warned against reaching for a misfed sheet and should not be told of the safety device or they are liable to depend on it and take a chance of grabbing for misfed paper.



Hinged delivery board

The delivery table should be mortised about an eighth of an inch deep and the backboard set into the mortise so paper will not slip under it. The hinges should also be mortised in so paper will not catch on them.

"No matter what a man's work, he can do it better if he is well informed. And the point here is that education, while it has a larger bearing than a mere preparation for one's trade or profession, is the very best equipment for any sort of efficiency." — *Dr. Frank Crane.*

One must do nothing in private life which will reflect unfavorably upon the organization of which he is a part. — *Charles R. Gow.*

DESIGN FOR THE HIGH SCHOOL PRINT SHOP

John L. Deal,
Jefferson High School,
Rochester, New York

The high school printing student seems to be at a loss when it comes to deciding just how to set a job. This is especially true when he wishes to produce a job which will qualify him for membership in The Jefferson Craft Guild.

How is he to design such a job, be it a booklet cover, a title page, a letterhead, a package label or any of the jobs which come to the school print shop; or how is he to handle the copy for a project which may be selected as a senior?

Printing-trade periodicals and "The Typography and Modern Layouts" by Ehrlich are placed at the disposal of the students, and he is encouraged to read and reread them and study every example of good printing which may come to his attention through the shop library or the Printing Craft Shop.

Having developed something of a background, and aided by round-table discussions with the instructor and small groups of students, the senior finds that a certain design among the examples of printing attracts his interest and attention. Finally he develops a more or less hazy idea of type masses and groupings. Perhaps he is not conscious of this background, but constant association with and discussion of good jobs of printing has built this up without his being conscious of it.

Then when the senior gets his copy, he may be able to think of a design which has interested him. Next, he tries to copy this design from memory, using the copy which he has received. After he has set his job, he may find by comparison with the original, that there is but slight similarity between the job which he has set and the original which he was trying to copy. Yet he produces a credible job of printing.

While the foregoing describes but a rough rule of the thumb method, it has proved workable for the student who does not go very deeply into the subject. Not too much may be claimed for it, but it is a method of procedure.

Ehrlich has any number of layouts and sometimes the student trys to design his job after some one example which pleases him. He must, however, give a good reason for selecting the design which he has chosen.

These two methods do not go very deeply into the subject but they do produce remarkable results with a student who does not have the ambition, nor the ability, nor the time to go farther into this phase of printing.

If this work is carried on with a heterogeneous group of boys coming all the way from grades 8A to 12A, the instructor, unless he has developed an efficient corps of assistants to work with him, has more to do than he can comfortably take care of.

To show how the method may be applied, the job of producing a notebook label for the home-economics department will be carried through the various steps. The size of the label is first carefully determined. Then the question is, how shall the job be set?

One of the students found an example of modern composition in the *Inland Printer* which he thought would serve as the basis for the design. He set the given copy according to this example as shown in Figure 1.

A proof of the job was taken and this was examined and discussed. One of the students made the suggestion that the text matter be moved over to the other side as in Figure 2.

The students feel free to make suggestions because they know that if they cannot give a very detailed explanation, they may at least say "that is the way it feels to me, I like it better that way."

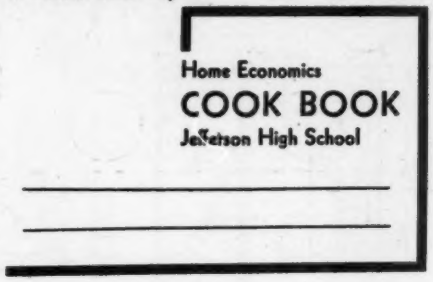


Fig. 1
The job as set by student

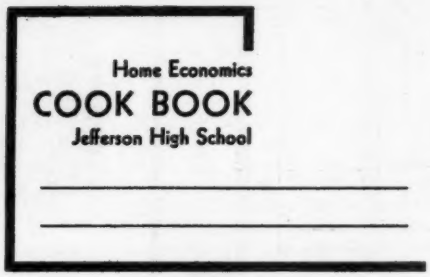


Fig. 2
The job after a suggested change

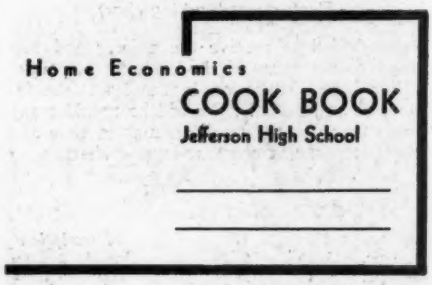


Fig. 3
The job as it appears after the supervisor (by request) "stuck his finger in the pie"

The proofs shown in Figures 1 and 2 were then placed before the supervisor of practical arts by the student, and the supervisor made several suggestions. He was very careful to explain to the student that he was speaking only for himself and that it was only his personal feeling in the matter. The job was then changed and a proof of it appears in Figure 3.

It was then again brought before the group of students: the original compositor, the student who made the constructive criticism and the group who had become interested in the job and whose comments and remarks showed their interest.

A more or less informal vote, or expression of opinion, then decided the matter and Figure 3 was selected as the best design.

Before this special design was declared "out of circulation" by the instructor, another design, Figure 4, showed the influence of the original. If this general layout had not been declared out of circulation it might have been used in every job from a "quarter sheet" down to an admission ticket to a school play.

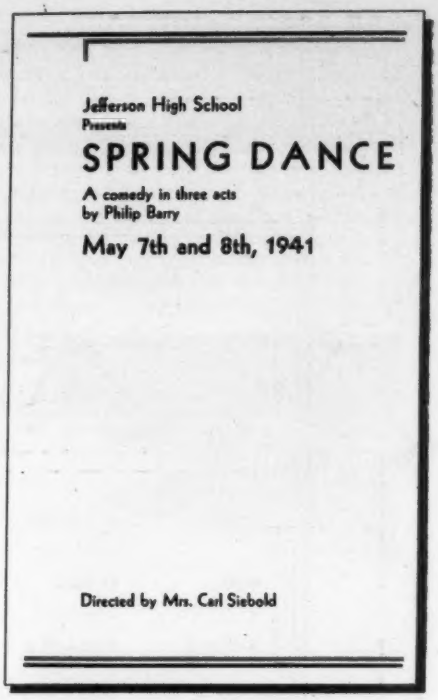


Fig. 4
Design showing influence of the original

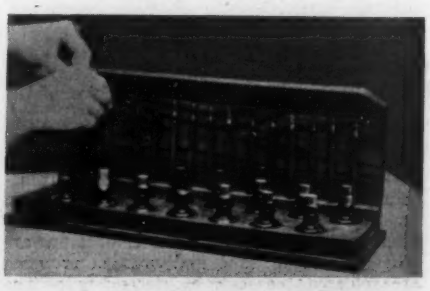
INK BOTTLE AND PEN CASE

Curtis Tracy,
Hershey Vocational School,
Hershey, Pennsylvania

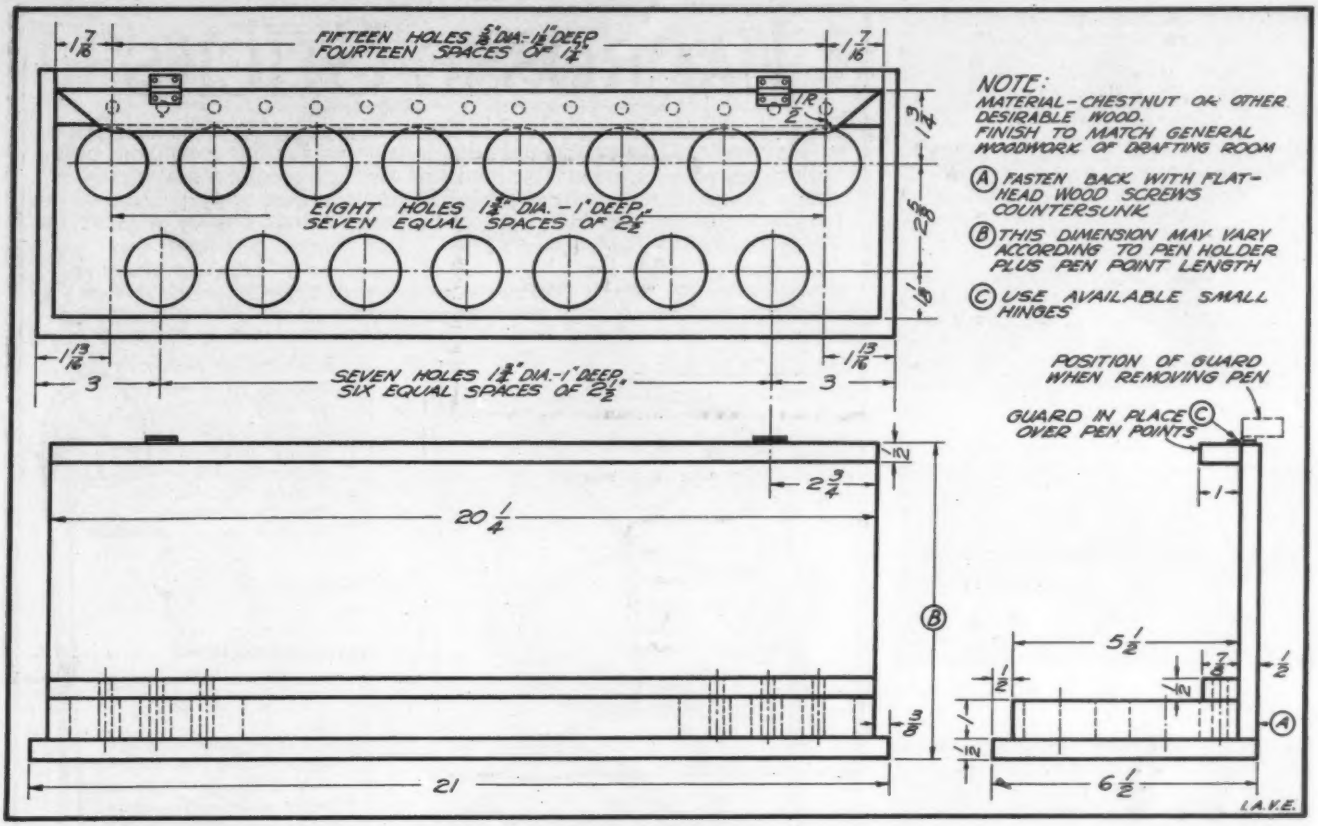
The project described in this article is especially useful in the drafting room. The same type of case, however, may be found helpful in other classes as well.

The superiority of the ink bottle and pen case rests upon the following points:

1. It is compact and readily portable.
2. The bottles are enclosed so that the ink is not easily spilled.
3. The bottles are staggered to make the checking process easy.
4. The pen points are guarded to prevent injury.
5. The pens are in full view to facilitate quick checking.
6. The capacity of the case may be increased to suit any size class.



Ink bottle and pen case


FIFTEEN HOLES 5/8" DIA-1/2" DEEP
FOURTEEN SPACES OF 1 1/2"
EIGHT HOLES 1 1/2" DIA.-1" DEEP
SEVEN EQUAL SPACES OF 2 1/2"
SEVEN HOLES 1 1/2" DIA.-1" DEEP
SIX EQUAL SPACES OF 2 1/2"
NOTE:
MATERIAL-CHESTNUT OR OTHER DESIRABLE WOOD.
FINISH TO MATCH GENERAL WOODWORK OF DRAFTING ROOM
(A) FASTEN BACK WITH FLAT-HEAD WOOD SCREWS COUNTERSUNK
(B) THIS DIMENSION MAY VARY ACCORDING TO PEN HOLDER PLUS PEN POINT LENGTH
(C) USE AVAILABLE SMALL HINGES
POSITION OF GUARD WHEN REMOVING PEN
GUARD IN PLACE OVER PEN POINTS
20 1/4
21
5 1/2
6 1/2
I.A.V.E.

7. The case may be so finished that it will correspond with the other furniture in the room.

From the half tone it may be seen that the quill corks of the drafting ink bottles have been discarded. They have been replaced with wood tops turned up in the school shop. Nails, flattened at the end and slightly curved to hold the ink, take the place of the quills. These tops have been used for more than eight years and during that time have proved their usefulness.

CAST-ALUMINUM CANDLE-HOLDERS

John Paustian,
University of Nebraska,
Lincoln, Nebraska

The idea for this Christmas project came originally from Mr. Orian Dhein and Mr. George Nickel of East High School, Madison, Wis., who made up a number of these castings in different sizes in aluminum. The immediate inspiration, however, was Paul Snow Tilden's white plaster star on page 28, section II, of the December, 1939, number of *House and Garden*. The project shown is a modification of that illustration.

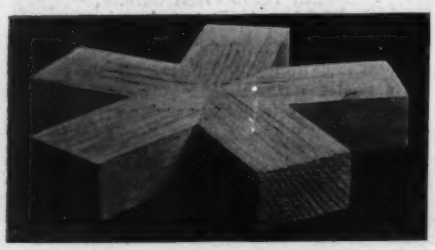


Fig. 1. Rough pattern

Fig. 3. Shaping the pattern

California sugar pine, with its sofe-textured short fibers, is the ideal wood for the pattern. With the aid of a simple protractor, lay out an angle of 72 deg. and use it as a template. Cut 5 pieces of white pine stock measuring 1¼ by 2 by 6 in. and mark the 72-deg. angle on one end of each piece. Saw these points, plane carefully to line, and glue them up as shown in Figure 1. Use a sheet of paper between the segments and an assembly board to make removal easier.

With the glue set, remove the segments from the assembly board, plane both sides, and mark the outline of the star on the built-up block using a paper template cut to size which is about 6 in. in diameter. See Figure 2. Be very careful to have the points and the center of the paper star coincide exactly with the segments of the pattern. The pattern can now be cut to outline with the band saw.

Shaping to finish is done entirely with ¾- and 1-in. chisels, as shown in Figure 3. Paring should proceed from the center toward the points. When all 5 points have been shaped, and the 5 ridges converge in a point at the center, cut the center down as shown in Figure 4, leaving the pattern ¾ in. in thick-

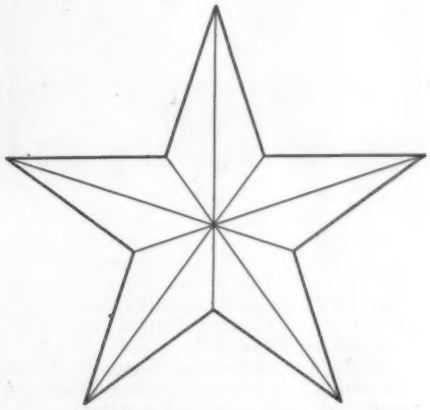


Fig. 2. Layout of the star

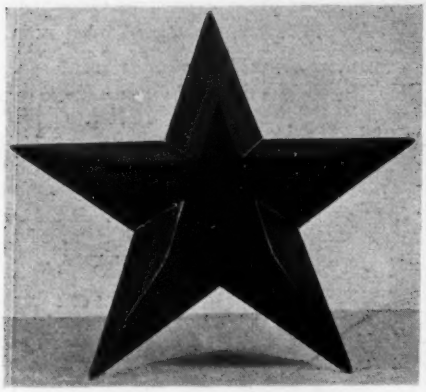


Fig. 4

Fig. 5. Open mold

Fig. 6. Pouring

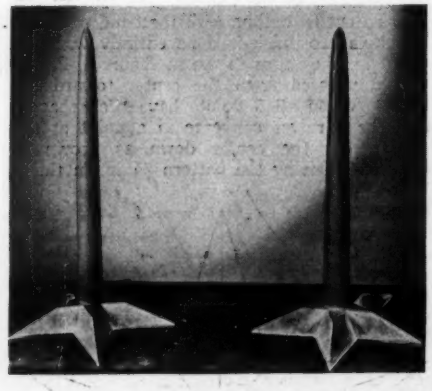
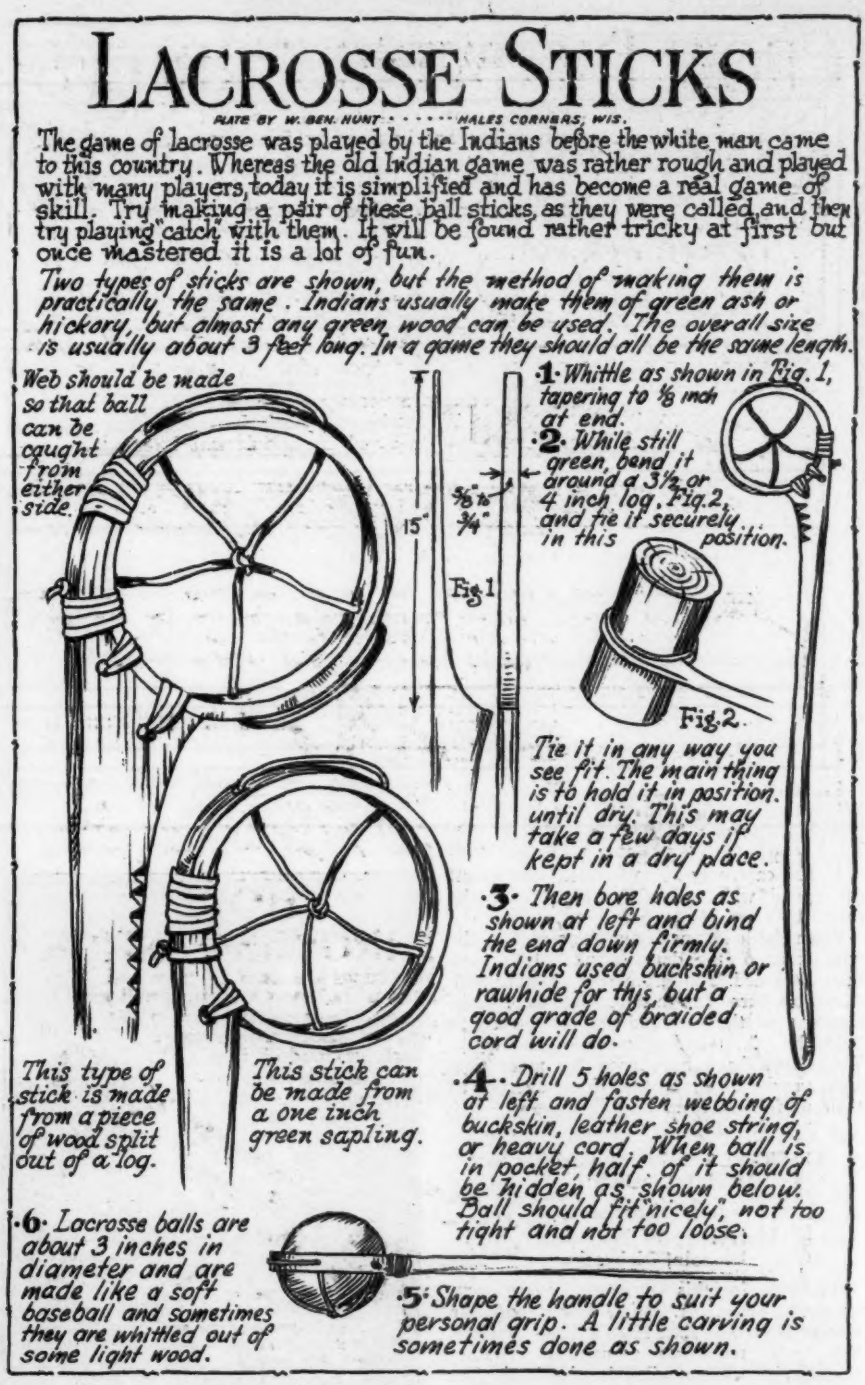


Fig. 8


LACROSSE STICKS
PLATE BY W. BEN. HUNT · · · · · · HALES CORNERS, WIS.
The game of lacrosse was played by the Indians before the white man came to this country. Whereas the old Indian game was rather rough and played with many players, today it is simplified and has become a real game of skill. Try making a pair of these ball sticks as they were called and then try playing "catch" with them. It will be found rather tricky at first but once mastered it is a lot of fun.
Two types of sticks are shown, but the method of making them is practically the same. Indians usually make them of green ash or hickory, but almost any green wood can be used. The overall size is usually about 3 feet long. In a game they should all be the same length.
Web should be made so that ball can be caught from either side.
15"
5/8" to 3/4"
Fig. 1
·1· Whittle as shown in Fig. 1, tapering to 1/8 inch at end.
·2· While still green, bend it around a 3 1/2 or 4 inch log. Fig. 2, and tie it securely in this position.
Fig. 2.
Tie it in any way you see fit. The main thing is to hold it in position until dry. This may take a few days if kept in a dry place.
·3· Then bore holes as shown at left and bind the end down firmly. Indians used buckskin or rawhide for this, but a good grade of braided cord will do.
This type of stick is made from a piece of wood split out of a log.
This stick can be made from a one inch green sapling.
·4· Drill 5 holes as shown at left and fasten webbing of buckskin, leather shoe string, or heavy cord. When ball is in pocket, half of it should be hidden as shown below. Ball should fit "nicely", not too tight and not too loose.
·6· Lacrosse balls are about 3 inches in diameter and are made like a soft baseball and sometimes they are whittled out of some light wood.
·5· Shape the handle to suit your personal grip. A little carving is sometimes done as shown.

ness. Sand all over with No. 2/0 sandpaper and finish the top side in red shellac and the bottom side in black, these being the standard foundry colors denoting finished and unfinished surfaces respectively.

The foundry operations, shown in Figures 5, 6, and 7, can be carried out as illustrated and should need no further explanation. The castings need only to be filed with a flat mill file, not too sharp, and polished with No. 2/0 emery cloth. Locate centers and drill 7/8 in. holes for the candle sockets. Figure 8 shows the candleholders ready for use.

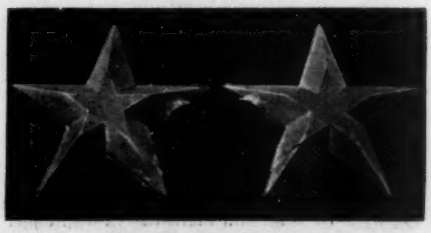


Fig. 7. Rough castings

HOW TO SOLVE THE *PI* PROBLEM

J. Orville Wood,
South Hills High School,
Pittsburgh, Pennsylvania

The ever present problem of sorting out and putting away "pi" has been easily and permanently eliminated in our school print shop. The work is quickly and correctly done to the delight of the instructor and to the satisfaction of the students.

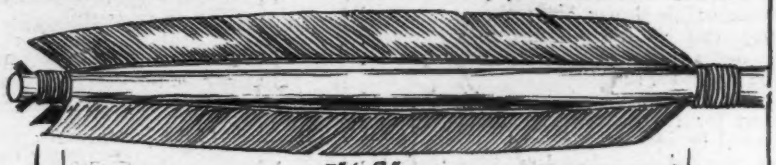
This disagreeable work is made a game or contest, and the cases are kept in better order than formerly and the students unconsciously learn the sizes and names of the type.

One of the main objectives of printing in the high school besides serving a guidance

CROW THROWING ARROWS

The Crow Indians game of throwing arrows is somewhat similar to our game of pitching horseshoes, but instead of fixed stakes to throw at, a somewhat lighter arrow is first thrown by one of the players as far as possible. The players then throw their arrows at this marker arrow and of course the closest arrow wins. The winner then throws the marker arrow as far as he can and they all try again, etc. Each player has two throwing arrows and of course someone must have a marker.

Select two straight saplings measuring ¾ to 1 inch at the thick end and about 4 feet long. Wild cherry is best but is not always available. Trim them down smoothly from ¾" thick at the point to ⅜" at the feathered end, straighten, and let them dry for a week or so.



5" to 7"

Three long feathers are tied on the small end as shown above and at left, spaced equidistant as for regular archery arrows. No glue is necessary, but feathers should be quite tight and wrappings should be shellacked or varnished.

Wrapping at balancing point.

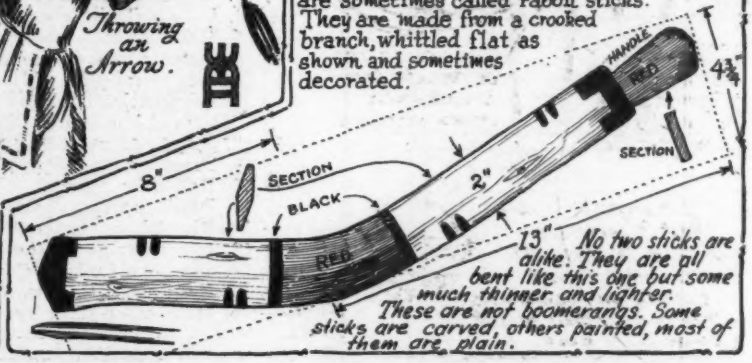
An iron or steel point is then set into a hole drilled into the large end of the shaft, and shaft is bound tightly with rawhide or soft wire to prevent splitting.

3" to 3½"

Throwing an Arrow.

HOPI THROWING STICK

These sticks are used by Hopi and other Southwest Indians for killing small game and are sometimes called rabbit sticks. They are made from a crooked branch, whittled flat as shown and sometimes decorated.



No two sticks are alike. They are all bent like this one but some much thinner and lighter. These are not boomerangs. Some sticks are carved, others painted, most of them are plain.

PRINT SHOP TEST

Identification of Sizes and Kinds of Type

Herewith is a proof of some of the sizes and all of the kinds of type in the School Print Shop. To the right of each letter or character write out the size and name of the kind of type you think it is. Do not use any abbreviations. A comparison of one with another will help you determine the size and kind. There are some duplicates of both sizes and kinds. There are no small capitals used. Return to the Instructor.

Student's Name.....

Date.....

a____ p____ n____ t____ λ____ B____ T____ A____ i____ U____ h____ n____ H____ O____ A____ r____ H____

D____ Q____ Q____ d____ m____ m____ D____ n____ m____ s____ R____ F____ o____ l____ r____ m____ u____ z____ G____ e____ c____ A____ G____

W____ a____ u____ z____ a____ s____ x____ m____ s____ H____ W____ B____ A____ t____ R____ M____ c____ m____ n____ r____ A____ C____

Fig. 1

function is instilling in the students the order of good habits. The job of learning type faces and sizes so that they may be kept in their proper cases is work which inculcates habit of order.

Every school printing shop where students use various sizes and kinds of type has the cases more or less mixed. There seems to be no other alternative when boys are learning the fundamentals of typesetting.

No matter how much precaution a printing instructor may take in trying to keep his type cases clean, the human element will always be with us and so will mixed type cases. Some boys actually do not know when they distribute the wrong size or kind of type in a case; others know the size or kind but do not use any precaution to make sure they have the right case before they start distributing; while still others seem to mix sizes and kinds for purely lack of honor, or persist in being careless because they do not care. Of course, the foregoing does not refer to cases where the wrong letters are carelessly (and sometimes purposely) put in the wrong boxes. Nearly any student may mix up a case more or less, even in composing from it, not mentioning the chance there is in his mixing it up when he distributes in it.

With all the caution, warning, watching, and help, the cases are in such shape at the end of each semester that a certain time is required for the students to take out all letters of every box of the entire range of cases, set them up correctly so that a quick check may be made. This then brings all the wrong fonts to light. Some shops insist that this idea of type kept upright in a case be maintained at all times. In some instances it may be insisted upon.

The following method is carried out in our school shop:

We have printed in a 14-page pamphlet a sample of all the kinds and sizes of the type used in the shop, with the names and sizes of each. Full explanation is made of the characteristics of the different kinds of type, the serifs, strokes, shoulder, and nicks. Also the difference between such kinds as Copperplate Gothic and Shaw Text; or between Goudy and Cheltenham. The student is required to study over the catalog for a time, augmenting this with comparing the type in the cases with the printed samples. Then he is given a completion test. This sheet is shown in Figure 1. On the sheet are printed about 75 letters comprising both capitals and small letters of all the kinds and sizes of type in the shop. The student is then required to state the size and name of each letter printed; in the case of the Copperplate Gothic the number of the

size must also be given. When the student has finished this the paper is checked with a master sheet. If no more than half of the letters have been correctly designated, more studying is done. When a satisfactory test has been passed, then the work of clinching the theory on his mind is done. From the "pi" box a line is set up of one size but of various kinds. Then the letters are assorted for kinds and he must tell the instructor what every kind is. He then returns the assorted type to the right cases. This is done for a number of days, varying the work with different sizes until he has handled all sizes and kinds and is able to tell at a glance the size and kind of any type we have in the shop.

With one or two boys working at this job at all times it is an easy matter to keep the "pi" box nearly always empty.

STUDENT LAMP IN MODERN DESIGN

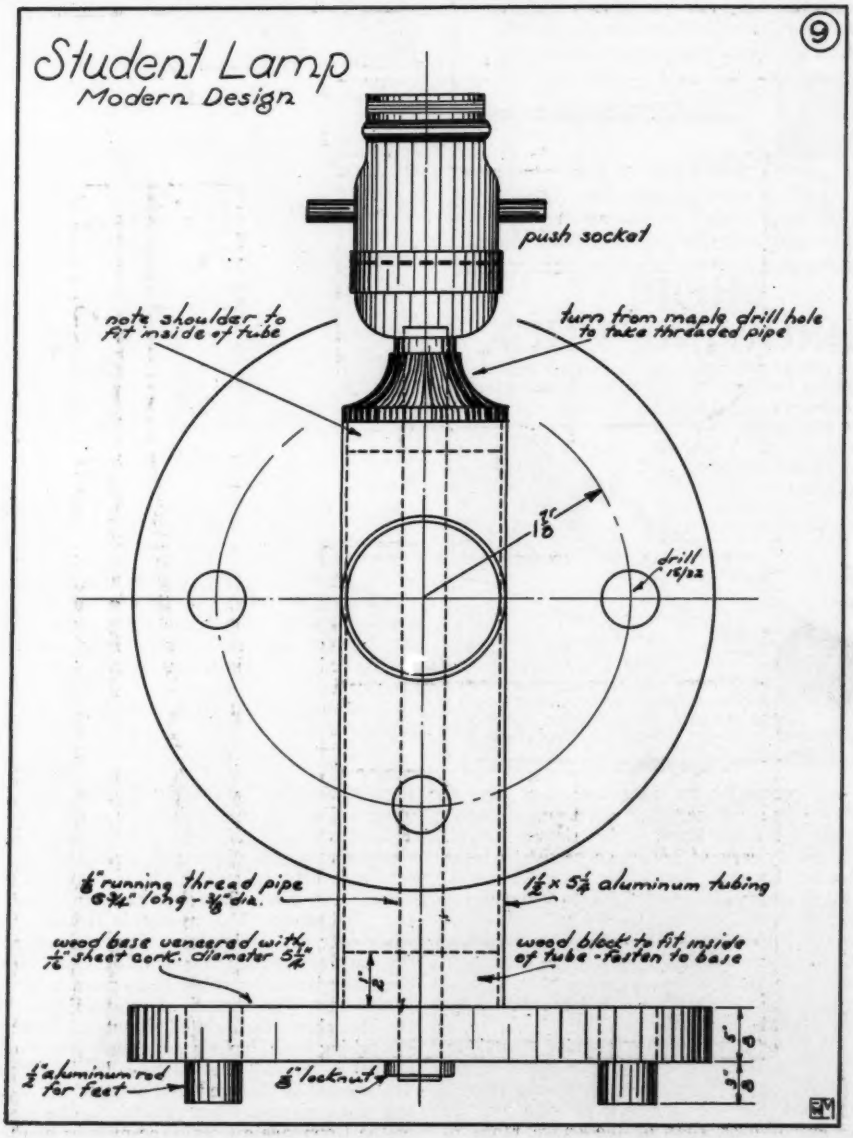
Emerson William Manzer,
Bronxville, New York

Many shop operations are involved in the making of the modern student lamp described herewith, such as wood turning, drilling, metal turning, electrical wiring, and finishing. These provide varied experiences for the student and an opportunity for the instructor to bring in interesting related material. Furthermore, the project is one that will instill student interest because it will belong to him when it is completed.

The post is made of aluminum tubing 1½ in. in dia. and 5¼ in. long. It may be made of wood with a natural finish to match the base. If aluminum is used, cut the tube to length and trim the ends on a metal lathe, holding the tube on a wood mandrel while the ends are being cut. Finish the tube with fine emery cloth while it is on the mandrel.

Turn the top for the tube, and the bottom block that holds the tube in place. These parts may be turned between a chuck and a follow block or by glueing a block to a piece of wood that has been attached to a faceplate, placing a piece of wrapping paper between the two wood surfaces.

The base is made of the same kind of wood used for the top piece. This also may be turned between a chuck and a follow block or attached to a faceplate. If desired, the small block may be turned on the base at the same time.


9
Student Lamp
Modern Design
push socket
note shoulder to fit inside of tube
turn from maple drill hole to take threaded pipe
drill 15/32
⅜" running thread pipe 6¾" long - ⅜" dia.
1½ x 5¼ aluminum tubing
wood base veneered with 1/16" sheet cork. diameter 5¼"
wood block to fit inside of tube - fasten to base
¼" aluminum rod for feet
⅜" locknut

Locate centers for the various holes so that all drill-press work may be done at one time. The four feet may be set in the base holes as shown, or they may be cut ⅜ in. long and fastened to the base with countersunk screws.

The parts of the lamp are held together by the threaded pipe that runs down through the tube or wooden post. Finish the parts with clear lacquer giving the wood parts two or three coats.

The shade should harmonize with the wood used in making the lamp. It is a part of the whole project and should be given careful consideration. Any old shade will not look well on a base of modern design.

ELEMENTARY GENERAL METALWORK

George A. Willoughby,
Industrial Arts Department
Michigan State Normal College,
Ypsilanti, Michigan

Cold Metalwork

Processes, activities, projects, jobs, and topics of information underlined by the instructor indicate the contents to be covered in a given course.

Each student will check in the space provided any work completed, after it has been approved by the instructor, to indicate his accomplishments.

Note to students: A check means that you are ready to be tested at any time on your ability to do things or on your knowledge of the topics listed.

If you do additional things or study additional topics, list them in spaces 16 to 26 inclusive.

Processes to be performed:

—— 1. Measure and mark for cutting, bending, or drilling
—— 2. Divide a ring or disk into a desirable number of parts
—— 3. Cut metal with a hack saw
—— 4. Cut metal with a cold chisel
—— 5. Make bends in band iron
—— 6. Make twists in band iron or small rod
—— 7. Form circles, scrolls, or other shapes in band iron or rods
—— 8. Shape cold metal by hammering
—— 9. Shape metal by filing
—— 10. Drill holes in metal
—— 11. Punch or enlarge holes in metal
—— 12. Rivet pieces together
—— 13. Join pieces using screws or bolts
—— 14. Tap holes for screws or bolts
—— 15. Apply finish to metal
—— 16 to 26 .....

Forging

Processes to be performed:

—— 1. Shape hot metals by hammering
—— 2. Shape metals by grinding
—— 3. Anneal tool steel
—— 4. Harden and temper tool steel
—— 5. Polish tool steel

Topics to be studied:

—— 1. Characteristics and uses of tool steel
—— 2. Heat colors and temperatures

Suggested things to do:

—— 1. Make a cold chisel
—— 2. Make a center punch
—— 3. Make a prick punch
—— 4. Make a solid punch
—— 5. Make a scriber
—— 6. Make a scratch awl
—— 7. Make a nail set

—— 8. Make a screw driver
—— 9. Make a knife (hunting or kitchen)
—— 10. Make blacksmith tongs

Metal Casting

Processes to be performed:
—— 1. Temper sand
—— 2. Set up molds
—— 3. Melt and pour metal
—— 4. Clean and finish castings

Topics to be studied:
—— 1. Accessories and tools used in casting
—— 2. Characteristics of casting metals

Suggested things to do:
—— 1. Cast book ends
—— 2. Cast a paperweight
—— 3. Cast a desk knife
—— 4. Cast a doorstop
—— 5. Cast a lamp
—— 6. Cast a wall plaque
—— 7. Cast a tray
—— 8. Cast tool handles (plane, saw)
—— 9. Cast a skillet

Topics to be studied:
—— 1. Characteristics and uses of mild steel
—— 2. Common shapes and sizes of mild steel
—— 3. Rivets used in metalwork
—— 4. Bolts and machine screws
—— 5. How steel is made

Suggested things to do:
—— 1. Make a reinforcement strip
—— 2. Make a reinforcement angle
—— 3. Make a bracket for a shelf
—— 4. Make a bracket for hanging a basket
—— 5. Make an ash-tray holder
—— 6. Make an occasional lamp
—— 7. Make a table lamp
—— 8. Make a foot scraper
—— 9. Make a desk lamp
—— 10. Make book ends
—— 11. Make a necktie rack
—— 12. Make a towel holder
—— 13. Make a fireplace brush holder
—— 14. Make fireplace tongs
—— 15. Make a fireplace poker
—— 16. Make a fireplace shovel
—— 17. Make a garden trowel
—— 18. Make a flowerpot stand
—— 19. Make a bridge lamp
—— 20. Make a campfire grate
—— 21. Make a paper knife
—— 22. Make a clamp
—— 23. Make a lantern bracket
—— 24. Make a strap
—— 25. Make a hinge
—— 26. Make a hasp
—— 27. Make a sign bracket
—— 28. Make a table
—— 29. Make a reel (hose)
—— 30. Make a reel (clothesline)
—— 31. Make a can holder
—— 32. Make a campstool
—— 33. Make a footstool
—— 34. Make a jardinier stand
—— 35. Make a music stand
—— 36. Make a door knocker

Sheet-Metal Work

Processes to be performed:
—— 1. Measure and mark for cutting or punching
—— 2. Make rectangular layouts
—— 3. Make circular layouts
—— 4. Cut with tinner's snips
—— 5. "Brake," fold or hem by hand
—— 6. Shape metal by hand
—— 7. Punch holes in sheet metal
—— 8. Drill holes in sheet metal
—— 9. Tin a soldering copper
—— 10. Solder pieces together
—— 11. Rivet pieces together
—— 12. Fasten with folded seam
—— 13. Make a single hem by hand
—— 14. Make a double hem by hand
—— 15. Make a wired edge by hand
—— 16. Apply finish to sheet metal

Topics to be studied:
—— 1. Common tools for sheet-metal work
—— 2. Common kinds and gauges of sheet metal
—— 3. Solder and principles of soldering
—— 4. Common fluxes and their use
—— 5. Tinner's rivets

Suggested things to do:
—— 1. Make a nailbox
—— 2. Make a matchbox
—— 3. Make a candleholder
—— 4. Make a cookie cutter
—— 5. Make a tin-can scoop
—— 6. Make book ends
—— 7. Make a nail cabinet
—— 8. Make a drawer
—— 9. Make a feed box
—— 10. Make a dustpan
—— 11. Make a hopper
—— 12. Make a kitchen memo
—— 13. Make a tool tray
—— 14. Make flagstone forms
—— 15. Make garden labels
—— 16. Make a letter rack
—— 17. Make a tool tray
—— 18. Make a cup
—— 19. Make a paint-brush container
—— 20. Make a weather vane
—— 21. Make tin can toys: (*a*) Boat, (*b*) Steam turbine, (*c*) Dishes, (*d*) Cart

TOWEL RACK

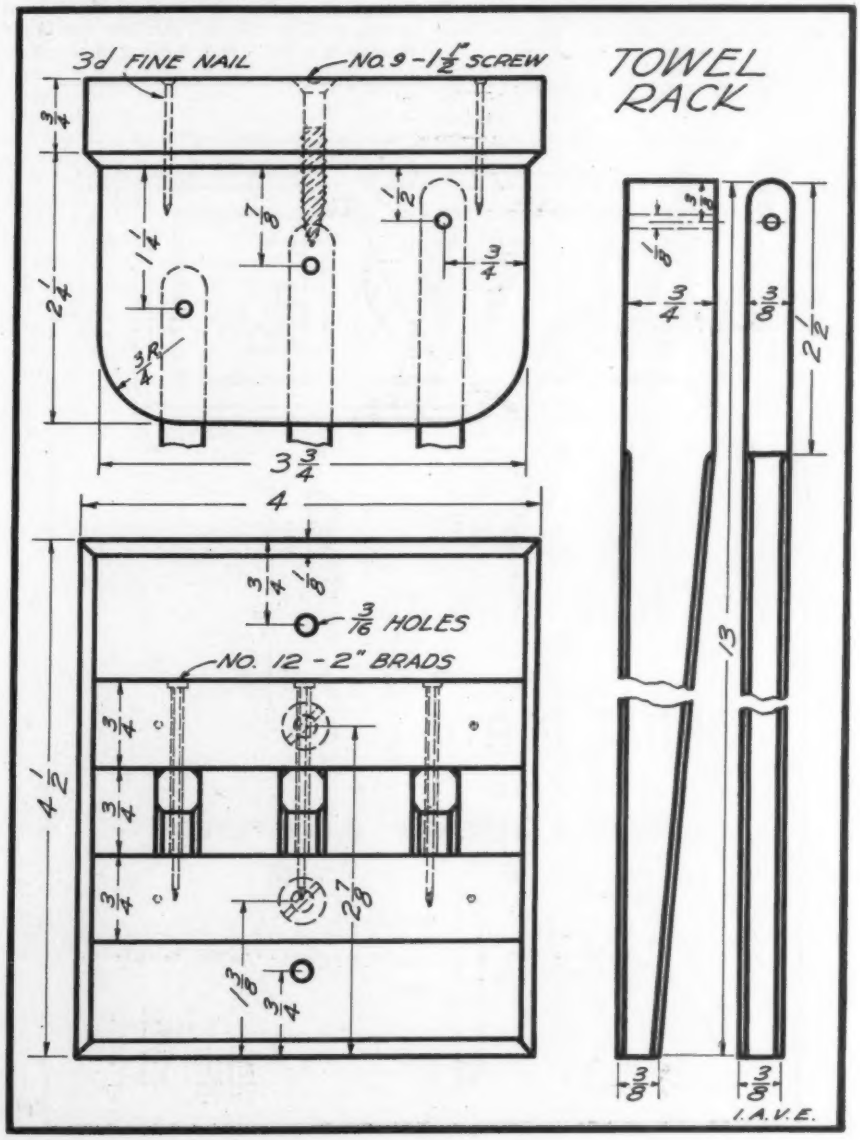
W. H. Morton,
Portland, Maine

The towel rack described herewith is a very practical project. The very generous bearing given to the arms prevents them from sagging.

Better alignment for the arms is obtained when the top shelf is fastened first. The second shelf may then be clamped in place with a parallel block between, after which it is fastened in place.

The lower block need not be bored for the nails which form the arm pivots. Simply drive the brads into it.

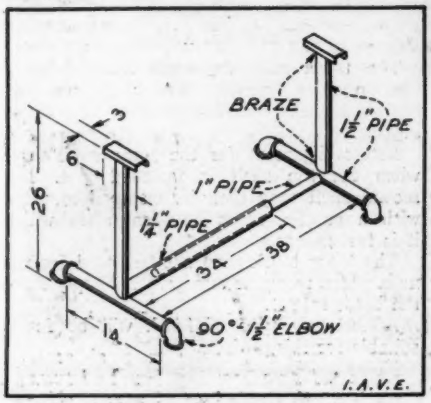
Almost any type of finish will be found suitable for this project.



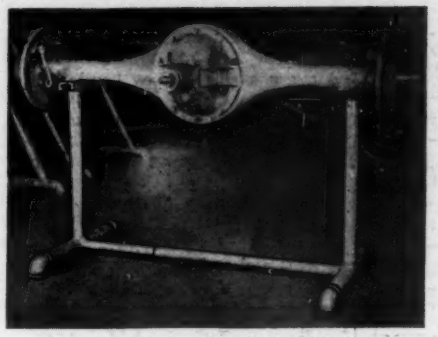
REAR AND FRONT AXLE STANDS

Ernest A. Venk,
Instructor, Auto Mechanics,
Fordson High School,
Dearborn, Michigan

Too often the auto-mechanics shop is the least attractive shop in the school system. Much of this is due to the lack of uniformity in the design of the stands upon which the equipment is mounted.



Adjustable axle stands



The rear axle stand illustrated in the accompanying illustrations, has done much to improve the appearance of our auto-mechanics shop. It was designed with two purposes in mind: (1 To have a safe stand of suitable height for students to work on laboratory equipment. (2) To have a stand that is adjustable in width so that it can be adjusted from year to year to the inevitable changes in design which will occur. Salvaged pipe obtained from our maintenance department was used throughout. Joints are bronze welded as shown, making this an excellent correlated problem for the school welding department.

A similar stand with an over-all height of 20 in. is also made for front axles.

Bill of Material

2 pc. 1½-in. dia. pipe 24 in. long.
2 pc. 1½-in. dia. pipe 14 in. long.
4 pc. 1½-in. 90 deg. elbows.
1 pc. 1¼-in. dia. pipe 34 in. long.
1 pc. 1-in. dia. pipe 34 in. long.
2 pc. 2 by 2 by 6-in. angles, or 3-in. channels

A SIMPLE FOUNDRY PROJECT

John Culnane,
Oswego, New York

For many years, the foundry work in industrial arts has been rather weak. Many instructors advise their students that each is to make his own pattern out of wood. Of course, it is almost an impossibility for an elementary or junior high pupil to do this and get suitable results. However, pattern-making should be part of the foundry work in the industrial-arts shop.

After spending much time in devising new and simple projects for this field, a name plate requiring a linoleum pattern was tried. This combined three fields of industrial-arts work, patternmaking, linoleum-block cutting, and foundry work. The project chosen has great possibilities because of its low cost, its simplicity, and the number of processes it involves. Besides name plates, wall plaques and similar flat pieces may be tried.

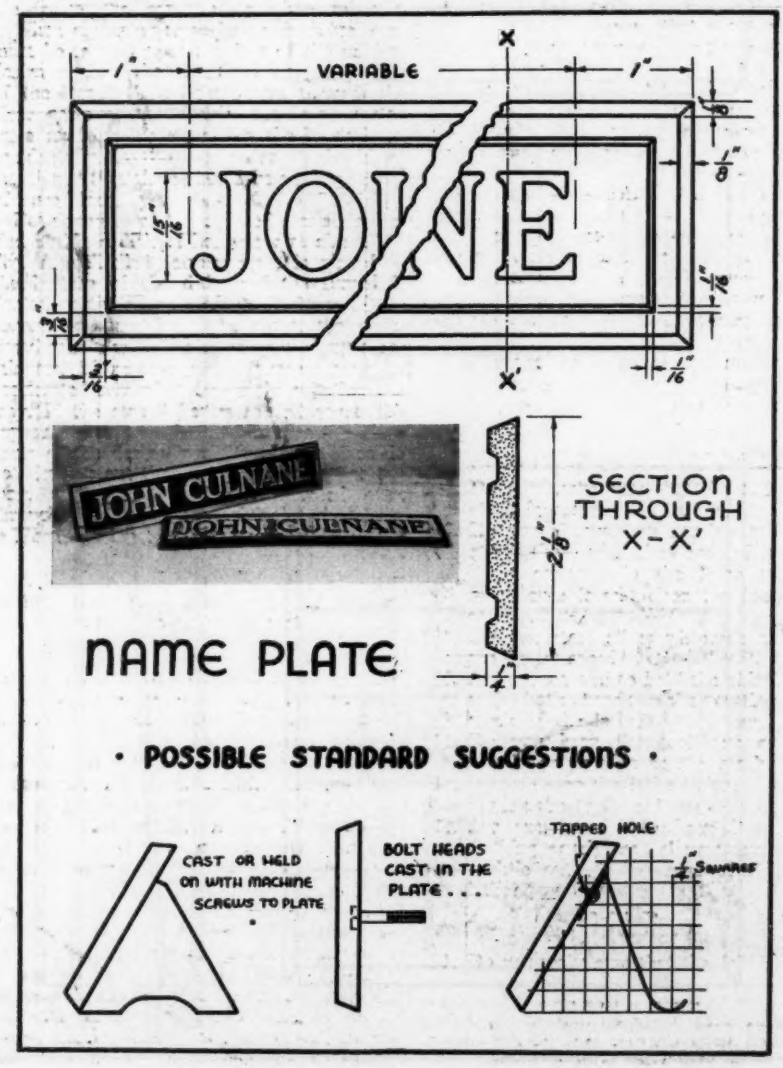
Procedure in Making the Pattern

1. When making a name plate, set up the name in type and take a proof.
2. After making sure that everything is all right, take an impression on the linoleum. When using other designs on wall plaques, for instance, it is necessary to make the tranfer with carbon paper.
3. Then cut out the linoleum as is done for any block print, but be sure to leave 30–45 deg. for draft.
4. When finished with the linoleum cutting tools, burnish the gouged parts; give the pattern a coat of shellac; and rub lightly with No. 6/0 sandpaper to prevent any pits in the mold.

Procedure in Making the Casting

A. The general procedure is practically the same as the method used with any foundry project. However, a few suggestions may be given which will save time and produce better results.

1. Place the pattern, face up, on the molding board.
2. Cover the pattern, lightly, with parting compound.
3. When ready to fill the cope, smooth the parting, and cover the drag with parting compound.
4. It is advisable to make the sprue holes in the middle, to one side of the pattern, and have the vent holes on either end.
5. After removing the cope, use a small straight wire to make a vent hole in each corner of the mold. Work the wire from the bottom up, using a circular motion.
6. Before removing the pattern, sprinkle water around the edges and tap lightly to make sure that no sand will pull with it.
7. For draw pins, two sharpened L-shaped wires, hooked into the burlap foundation of the linoleum, work very nicely.
8. After cutting the gates, remove any foreign sand that may be in the mold, replace the cope, weight the flask, and the mold is ready for pouring.



Procedure for Finishing the Casting

1. After the casting has cooled, remove the excess metal that filled the sprue and vent holes.
2. If aluminum is used, a very nice effect is obtained by painting the gouged part with black crystal paint.
3. After the paint has dried, drawfile the face and edges of the casting.
4. To obtain a high luster for the final polish, use emery and crocus cloth.

To make the name plate stand at the right angle, use any of the suggestions given in the illustration.

With the exception of the linoleum, the ordinary industrial-arts shop possesses all the necessary materials and equipment for this project. The linoleum may be bought at a department store for practically nothing, because they have useless scraps which are just the thing for this type of project.

When finished, the name plate has the appearance of a commercial product, yet, it may be completed by a student within 6 to 8 hours.

DUPLICATING STENCILS CUT BY LIGHT

W. Bruce Adams,
Church Street School for Boys,
Toronto, Ontario, Canada

Duplicating stencils of subjects containing considerable detail, such as charts, maps, diagrams, line illustrations, or printed matter, may be produced with simple equipment by the use of specially prepared photographic stencil sheets now available.

These stencils are sold unsensitized, but the only chemical needed to prepare them for exposure to light is potassium bichromate, which may be purchased from dealers in photographic or graphic-arts materials.

Printing is done from a positive original, which may be a photographic transparency on glass, film, or thin paper; a drawing done with India ink on tracing paper; or a printed sheet, provided that the printing is on one side only. In cases where the printing is on both sides, or where it is undesirable to mutilate the original, a copy negative may be prepared either by the use of a camera or by reflection copying. From this a positive transparency is then made.

Fig. 1. The unsensitized mimeograph stencil is cut to the desired size. Fig. 2. A polished ferrotype tin is placed in the tray of sensitizer

Fig. 3. The stencil is immersed in the sensitizing solution. Fig. 4. It is then withdrawn on the ferrotype tin

The mimeograph stencils come in sheets measuring 8¼ by 17 in., but it will be more convenient to cut them into smaller sizes so that large trays will not be needed. Individual stencils measuring 5 by 7 in., are easily handled, and will be found quite large enough for most purposes.

A ferrotype tin is needed for each stencil to be sensitized. If small stencils are to be used as advised above, 10 by 14 in. ferrotype tin may be cut into four sections. Melted beeswax, which is sold at most drugstores, is painted over the exposed metal edges to prevent any possible reaction with the sensitizing solution.

This solution is prepared by dissolving ½ oz. of potassium bichromate in 16 oz. of water. It will keep for a reasonable time if stored in brown bottles in a cool place. It should be used at a temperature of about 65 deg. If it is too warm, there is a danger of melting the gelatin coating on the stencil.

Sensitizing may be done in daylight, since the stencils do not become sensitive to light until dry. The first step is to prepare the required number of ferrotype tins by polishing them with a drop of light sewing-machine oil. The potassium bichromate solution is poured into an enameled tray, in the bottom of which has been placed one of the ferrotype tins, polished side up. The unsensitized stencil is floated on the surface with the coated side down. It is then carefully submerged and left in the solution for two minutes. At the end of this time it is withdrawn by lifting the ferrotype tin and stencil together from the tray in such a manner that the stencil lies flat on the polished surface of the tin.

Fig. 5. Excess solution is squeegeed off, and the stencils are dried in a dark cupboard. Fig. 6. The stencil and design are held in contact by the use of an improvised printing frame

Fig. 7. Light for exposure is supplied by a photoflood lamp. Fig. 8. The exposed stencil is floated face down in warm water

Excess sensitizer is removed by squeegeeing, and the stencil is dried in a cupboard or other dark place. If the sensitizing is done at night, the stencils will be ready the next morning. They may be kept for a short time in a lighttight box, but it is advisable to use them as soon as possible.

The usual photoprinting frame may be used for holding the stencil and the original in close contact during exposure. If such a frame is not available, one may be improvised by clamping the stencil and drawing between two sheets of glass. Inexpensive spring clips may be used to insure good contact. Light for exposure is supplied by a No. 2 Photoflood

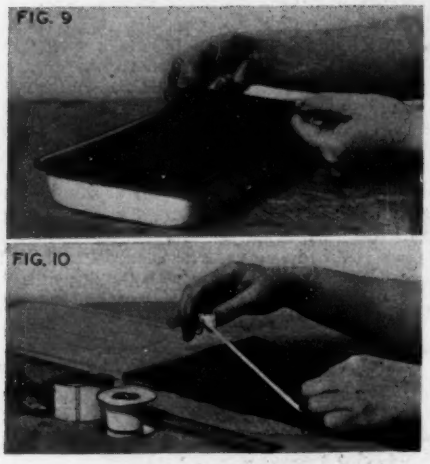


Fig. 9. When development is complete, the stencil is removed on a ferrotype tin. Fig. 10. When dry, the photo stencil is taped behind an opening in a regular stencil sheet

lamp in a reflector. The correct exposure must be found by experiment, but as a rough guide it may be said that using a design on tracing paper, with the light nine inches from the frame, the exposure was three minutes.

When preparing to make an exposure, care must be taken to put the face of the original design against the sensitized or glossy side of the stencil. The light passes through the clear parts of the design, but is prevented from reaching the stencil by the black lines. Incidentally, in this connection it should be mentioned that there should be no large areas of pure black.

Development of the exposed stencil is carried out in a dish of hot water at about 120 deg. A well-oiled ferrotype tin is placed in the bottom of the dish, and the stencil is floated on the water, glossy side down. If the correct exposure has been given, the unexposed gelatin will dissolve away in about three minutes. If necessary, the process may be accelerated somewhat by gently agitating the tray. If the stencil begins to fall apart, the exposure was too short to render the clear parts of the design insoluble. If the lines do not develop out thoroughly, exposure was too long, and the light has penetrated even through the lines of the original.

When development has been completed, the stencil is carefully withdrawn on the ferrotype tin as before, and allowed to dry. It may then be stripped off, and is ready for printing.

The best way to print these stencils is to cut an opening somewhat smaller than the photo stencil in an ordinary stencil sheet, and to fasten the photo stencil in place with adhesive tape. If desired, typewritten matter may be combined with the photographic illustrations.

SAFETY CHECK LIST

George W. Deffendahl,
Baker School,
Evansville, Indiana

The student is asked to check himself on the following safety rules.

General Safety in the Shop

	Yes	No
1. Do you operate the machines while the instructor is out of the room?	—	—
2. Do you make sure that all safety guards are kept in their proper position?	—	—
3. Do you have adjustments securely fastened before turning on the power?	—	—
4. Do you keep the floor around the machines cleared of scraps?	—	—
5. Are you always considerate of the rights and privileges of your classmates?	—	—
6. Do you apply *first aid* to all injuries?	—	—
7. Are you careful to keep all oily or stained rags in the steel container?	—	—

Jig Saw

	Yes	No
1. Do you see that the hold-down is properly adjusted?	—	—
2. Do you keep the hands from across the saw line?	—	—
3. Do you hold the stock firmly while feeding the saw?	—	—
4. Before making any adjustments do you turn off the power and allow the saw to come to a dead stop?	—	—
5. Do you feed the saw slowly?	—	—

Grinder

	Yes	No
1. Do you wear goggles while operating the grinder?	—	—
2. Do you make sure that the tool rests are properly adjusted and securely fastened?	—	—
3. Are you careful not to hold small pieces of metal with the fingers?	—	—
4. Do you hold the stock firmly while operating the grinder?	—	—

Wood-Turning Lathe

	Yes	No
1. Are you careful to examine all stock for checks, knots, or other defects?	—	—
2. Do you make sure that all glued work is properly set before being turned?	—	—
3. Do you see that the dead center is properly oiled?	—	—
4. Do you make sure that all stock is properly centered?	—	—
5. Do you have your stock fastened firmly between centers?	—	—
6. Do you make sure that the tailstock is securely locked?	—	—
7. Do you always turn rough stock a few times with the hands after being centered in the lathe to make sure it will clear the tool rest?	—	—
8. Do you start all rough work at the lowest speed?	—	—
9. Are you careful to hold the chisel with both hands while cutting stock in the lathe?	—	—
10. Do you keep the tool rest as closely as possible to the stock?	—	—
11. Do you stop the lathe before adjusting the tool rest?	—	—
12. Are you careful to keep loose clothing such as sleeves and necktie out of the range of the lathe?	—	—

Drill Press

	Yes	No
1. Do you make sure that the drill is firmly fastened in the chuck before turning on the power?	—	—
2. Do you always take the key out of the chuck?	—	—
3. Do you center all holes with a punch?	—	—
4. Do you make sure that all work is clamped firmly in the vise?	—	—
5. Do you line all work before turning on the power?	—	—
6. Are you careful to feed the drill slowly?	—	—
7. Do you make adjustments only when the machine is at a dead stop?	—	—

After looking over your own check list, do you consider yourself a safe worker?

LINOLEUM-BLOCK CUTTING

H. Gordon Douglas,
Printing Instructor,
Neinas Intermediate School,
Detroit, Michigan

A good grade of linoleum block is one in which the linoleum is mounted on five-ply veneer as shown in Figures 1 and 2. The linoleum is glued to the plywood with a piece of burlap between the two.

If unmounted linoleum is used, it must be mounted or glued to a piece of wood so that the combination is type high or approximately ⅞ in. thick. The block must be type high to be used in the printing press.

The first step in cutting out a linoleum block is the selection of a silhouette or picture. Choose one in which there are solid blacks and whites. Fine lines and shading should be avoided by the beginner.

If the student has the ability to make a design of his own, he should be allowed to do so. The design should be such as to *fill the space* with an interesting distribution of large and small shapes in white and black.

Take the silhouette or design chosen and place it upon the linoleum block with a piece of pencil carbon between them. Be sure the carbon side is against the linoleum. Fasten the silhouette to the block securely with thumbtacks so that it cannot move while it is being traced. Trace the silhouette upon the block with a hard pencil making sure that no detail has been missed before removing the silhouette and carbon.

The block is then ready for the actual cutting. Select the smallest V-shaped veining tool and carefully outline the design. Keep as close to the line as possible, but do not cut into the design. After this veining has been completed, select a larger and U-shaped gouge, and cut out all parts that are not to print.

Figure 1 shows how not to cut linoleum. This method leaves an edge that will break down eventually and which at best will not give a good impression. The lack of support

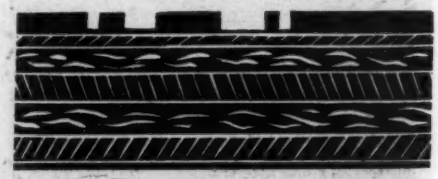


Fig. 1. Wrong method of cutting

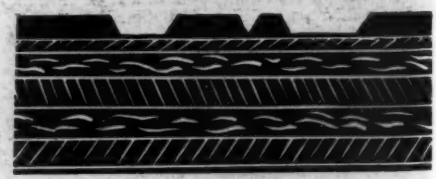


Fig. 2. Right method of cutting

Examples of linoleum-block prints

or foundation causes the linoleum to give way or sag under pressure, resulting in a poor copy each time an impression is taken.

Figure 2 shows the correct method of cutting parts out of linoleum. This method leaves a foundation that supports the edges against sagging or breaking down.

Be sure to use only the method shown in Figure 2. Cut out wherever necessary and have the cuts deep enough so they will not smear the printed copies. When finished, take a trial proof. Trim up any ragged edges and the block is completed.

Figure 3 shows some good examples of designs suitable for linoleum blocks.

COLORING METALS

E. L. Longley,
Baltimore, Maryland

The following are a few simple formulas for coloring various metals used in art metal and jewelry work. These may well be used in the school shop without great danger or disagreeable features except for some odors which one becomes used to in a short while.

All pieces to be oxidized must be thoroughly cleaned whether they have a satin finish or a bright surface. If polished, remove all rouge or grease by washing with a warm solution of soap and water to which a little ammonia has been added. They must then be thoroughly rinsed and dried.

For Copper

Your hands, being moist and containing chemicals, may be rubbed over a polished job, producing delicate coloring characteristics.

Heat: Heat produces a series of colors on copper. After the desired color has been obtained, the job should be waxed with floor wax to preserve the finish.

Liver of Sulphur — Cold: A small piece of liver of sulphur, say about the size of a navy bean, may be dissolved in one gallon of cold water. The project may be dipped and redipped until the desired darkness is produced. If the liver of sulphur is somewhat old, a larger piece may be necessary. Slow oxidizing is preferable to rapid, because the result may be better controlled.

A smaller quantity may also be made and applied with a brush. This is preferable where the oxidation is to be used in certain places only; e.g., as a background for a lettered sign where the background has been etched away and the letters or figures remain and are desired bright.

Liver of Sulphur — Hot: If the solution just described is heated to boiling, and then the heat turned off, it will produce a combination of oxidized and colored surface. This is probably the best coloring method for the beginner, as it can be made to produce a greater variety of results than any other. The copper, on dipping, goes through the following changes:

The first colors to appear, unless the solution is very weak, are a beautiful red and blue. These are difficult to preserve. They next turn into a greenish hue and then to a brass color. Red, blue, and purple follow, then brown or chestnut. From this point the color merely darkens. These colors may be preserved by waxing or lacquering.

Another cheap and simple formula, which gives a variety of colors from a gray, through the reds, to the final color of blue, follows:

Acetate of lead, 300 gr.
Hyposulphite of soda, 600 gr.
Water, 1 qt.

Dissolve the salts in the water and then heat to ebullition. The metal is then immersed until the desired color begins to appear, after which it is removed, dried, and waxed or lacquered.

Red: — A royal red may be produced by boiling the copper article in a strong solution of tartar and water — cream of tartar will be satisfactory.

Red: — bright
Sulphide of antimony, 2 dr.
Pearl ash, 1 oz.
Water, 1 pt.

Green: — Sodium chloride, 37 parts
Ammonia water, 75 parts
Ammonium chloride, 37 parts
Vinegar, 5000 parts
Apply with brush.

Verdigris: — Water, 1 qt.
Sal ammoniac, 1 oz.
Salt, ¼ oz. Dip and redip.

For Brass

Probably the most commonly used chemical for coloring brass is antimony chloride — butter of antimony. This gives a beautifully oxidized purplish color which can be rubbed down showing high lights.

Green: — (1) Repeated applications of alternate washes of dilute acetic acid and exposure to fumes of ammonia.

2) One part of percholoide of iron in two parts of water. Immerse. The tone darkens with the length of immersion.

Red: — Hyposulphite of soda, 16 dr.
Nitric acid, 1 dr.
also: Hyposulphite of soda, 16 dr.
Nitrate of iron, 16 dr.
Water, 1 pt.

Brown: — Nitrate of iron, 5 dr.
Water, 1 pt.

For Silver

Rub with silver nitrate. Blackening occurs.

Liver of sulphur is another common oxidizer for silver. It gives an iridescent coloring at first which will go into black if immersed too long. This solution may also be painted on. A weak solution allows the colors to be seen as they arise. It may be used hot or cold.

Brown: — Liver of sulphur
Sal ammoniac
Copper sulphate
Use equal parts in vinegar.

Coloring for brass usually suits *nickel silver*. The Metal Crafts Company, Providence, R. I., sell a solution called Oxifluid which produces oxidation on copper, brass, and nickel silver.

For Aluminum

To blacken aluminum, use:
White arsenic, 1 oz.
Sulphate of iron, 1 oz.
Hydrogen chloride, 12 oz.
Water, 12 oz.

When the arsenic and iron are dissolved by the acid, add the water.

Many other formulas may be found and many interesting experiments may be performed in the act of coloring metal.

PRINTING TEACHERS GIVE VIEWS IN SYMPOSIA

R. Randolph Karch, Principal,
Printing High School,
Cincinnati, Ohio

Type Composition Symposium for Junior High Schools

Chairmen: Edward W. Kurtz and W. C. Hagan

1. How far should one go in the teaching of hand composition of straight matter?

It is the consensus of opinion that approximately a minimum of 300 m's are a sufficient amount for instruction in the composition of straight matter. The boy should be able to justify and set a regular paragraph of type, and he should have sufficient drill until he can do that.

2. Is the average school now equipped for teaching anything other than straight matter composition?

It was unanimous that all schools are equipped for teaching other than straight matter composition.

3. What part should the instructor take in production work? Can the students do it? Should the teacher do it? Where production must be done to hold one's job, how can composition best be handled to really teach through the doing of it?

The instructor should guide students. The average junior high school student cannot do production printing. However, there are a few outstanding exceptions. Production work, if it can be handled at all, could be done by a few upper-grade students under the guidance of the instructor.

4. What devices are in use for keeping cases clean; that is, not mixed?

One successful method of keeping cases clean is to give out individual fonts to students, the instructor retaining a proof, requiring this to be set and returned at the end of the semester.

5. What, if any, typecasting machines should be included in the shop?

None.

6. What instructional material is available, and what kind is needed for teaching composition at this level of education?

Plenty of standard textbooks are available from which a course could be adapted.

7. Can any standards be set up as to what constitutes a good course of study?

Yes, standards can be set up, but any standard set up should take into consideration the junior high school objectives and the ability of the individual student.

8. When a teacher finds the type of instructional material he wants, is any difficulty encountered in its purchase for student use?

It is found that a small percentage use a textbook for each student. However, only a few of them have found difficulty in securing them from the boards of education.

9. Where automatic machinery, i.e., Linotype and Intertype machines, Monotypes, mitering machines, saw trimmers, etc., are not in shop equipment, what can be taught concerning them?

The operation of automatic machines may be explained in short lectures and through the use of diagrams and charts which may be obtained from various manufacturers. Also, through visits to plants.

10. Criticism has been made of printing teachers who have practically no actual experience necessary in this strata of printing education?

Experience as a tradesman is not considered necessary to an instructor in the junior high school.

12. How can the installation of one Linotype or Intertype be justified?

It is not justified in a junior high school.

13. What can the teacher do to keep up with the advance of type composition?

The teacher can keep up with advance composition by attending conventions, by listening to experts, by visiting plants, and by subscribing to trade periodicals and magazines, and studying the product of our best typographers.

14. Should layout be taught in hand composition, or in a layout class?

Layout should be handled along with the instruction of composition.

15. What can the teacher-training institutions do to help teachers of printing in this area?

It is found that no teacher-training institutions offer practical printing courses on a graduate level and we, therefore, make the suggestion that a request for the establishment of such courses be made through the offices of the National Graphic Arts Education Association.

Type Composition Symposium for Senior High Schools

Chairmen: John Heinike and Crawford Park

1. How far should one go in the teaching of hand composition of straight matter?

Hand composition of straight matter should be taught until the boy is proficient in spacing, in justification, and in handling type. The natural ability of the boy enters into it.

2. Is the average school now equipped for teaching anything other than straight-matter composition?

Yes, every senior high school has a fair equipment of type.

3. What part should the instructor take in production work? Can the students do it? Should the teacher do it? Where production must be done to hold one's job, how can composition best be handled to really teach through the doing of it?

The instructor should take no part in the production work. He should be the supervisor.

4. What devices are in use for keeping cases clean; that is, not mixed?

There are plenty of devices, but we still have mixed cases. It was suggested that we give them lessons in type faces and type sizes.

5. What, if any, typecasting machines should be included in the shop?

There should be no typecasting machines.

6. What instructional material is available, and what kind is needed for teaching composition at this level of education?

The I.T.U. courses of instruction are available. Books that are available are *Printing for School and Shop* by Frank Henry, and *Printing and the Allied Trades* by R. Randolph Karch. Many other books may be obtained.

7. Can any standards be set up as to what constitutes a good course of study?

Individual standards are set up. The I.T.U. courses would be a good standard to follow in relation to how to plan instruction sheets.

8. When a teacher finds the type of instructional material he wants, is any difficulty encountered in its purchase for student use?

No trouble is had only that boards of education will not accept books from five to eight years old.

9. Where automatic machinery, i.e., Linotype and Intertype machines, Monotypes, mitering machines, saw trimmers, etc., are not in shop equipment, what can be taught concerning them?

They may be taught to some extent through books, printed material, plant visitations where actual machines may be viewed and studied.

10. Criticism has been made of printing teachers who have practically no experience as printers. Is this experience necessary in this strata of printing education?

Where there is no vocational training — the objective is to teach students about the printing and provide some laboratory experiences — commercial trade experience is not necessary but is desirable. Where the motive is even indirectly vocational, commercial shop experience is necessary.

11. In the senior high school, what can be stressed to really take an adequate step beyond the work of the junior high school?

The method suggested was to have the junior high schools make use of the same core of procedures, training, and information as the senior high schools, only enlarging upon the work in the senior high school.

12. How can the installation of one Linotype or Intertype be justified?

This cannot be justified.

13. What can the teacher do to keep up with the advance of type composition?

If there is a craftsmen's group in his city, the teacher should join it. He should get the literature from paper houses, etc., and keep in contact with the keymen in the industry. He also can get information through the trade journals.

14. Should layout be taught in hand composition, or in a layout class?

It is good to teach it in both places.

16. How should students be scheduled for this work? Should the course be concentrated in one or two semesters, or spread out over a period of several years?

Concentration of time is preferred to a spreading of time up to a certain point.

17. What can the teacher-training institutions do to help teachers of printing in this area?

They can recognize ability and promote trade training. The teacher-training schools should become more liberal in granting credits for work that will help teachers do a better job of teaching. The training ought also help teachers become more practical minded about the work which they are to present to their students.

18. Is supervision of printing teachers on a high plane? Is undue difficulty had with scheduling, getting adequate supplies, production, etc.?

The supervision is on a low plane. It was suggested that there be a chairman who could help co-ordinate the work and help in the solving of problems; that is, where a supervisor is not already on hand.

Type Composition Symposium for Vocational Schools*

Chairmen: Frank DiGiacomo and Chester A. Lyle

I. Requirements of students for admission to vocational printing courses.

Mr. DiGiacomo began the discussion by restating some of the objectives of the vocational schools. He stated that some schools have been deceiving the students as well as the public by allowing them to think the schools are sending out trained craftsmen. One of the objectives should be the objectives of education as a whole; to teach the student good attitudes and habits; to make him a better adjusted individual and to give him the fundamental skills so that he could go out on the job and be responsible on a beginner's job.

The age requirement should be considered for entering students. There is an age where a boy is ready for trade instruction and this fact should be taken into account.

II. Minimum equipment for vocational printing courses.

A. Is the average school now equipped for teaching anything other than straight matter composition?

Yes, there should be enough equipment to teach straight matter composition, and most of the shops are equipped to a much greater extent.

It is not justifiable to set up a linotype in any school unless it is to work on a large scale. Hand composition should be given to the students previous to the linotype.

III. Methods of teaching type composition.

A. What devices are in use for keeping cases clean?

1. Assign a case for each student and hold him responsible.
2. Each student is to be held responsible for an additional case of display type.
3. Put the student's name, and a number on each case, and they take pride in knowing that they have their own.
4. Get the students to realize that they can acquire more speed if they keep their cases clean.

B. What instructional material is needed in teaching type composition? How much of this is available?

There are various kinds of instructional material available, such as textbooks, Ralph Hoke's card on type faces including a history of the background, proofreader's chart from Comet Press, Pennsylvania Ave., Brooklyn, N. Y., etc.

C. What difficulties does the teacher encounter in securing desirable instructional material?

There is very little difficulty in securing desirable material. Most of the paper houses are willing to give a great deal of material or it is possible to make up one's own.

IV. Teacher training for type composition.

A. How much practical printing experience is needed for teaching in vocational schools?

1. Should have general training.
2. They must know how to teach the trade and not just know the trade.
3. About 480 teaching hours should be necessary, five years of journeyman experience after serving an apprenticeship.

D. How can the teacher keep up with progress in type composition?

1. Study in his own classroom.
2. Visit print shops.
3. Read trade journals.
4. Be a member of the Craftmen's Club.

V. Curriculum Content.

A. What standards can be set up for a course of study in type composition?

This depends entirely on the amount of equipment and material available in a shop.

VI. Placement of graduates.

A. What practices have proved most successful in placing graduates of vocational printing courses?

Teachers should be members of a trade-union, craftsmen's group, civic clubs, etc.; also make frequent visits to local plants and become acquainted with foremen and superintendents.

*This group did not conform to the general plan of the conference, so that comparisons cannot be easily made with other levels of printing education.

PEENING, SCROLLS, AND FINISHES FOR METALWORK

William W. Wills,
South High School,
Denver, Colorado, and

Delmar W. Olson,
Southern Illinois State
Normal University
Carbondale, Illinois

In this age of iron and steel, many home-craftsmen and school-shop students display a growing desire to produce beauty and utility through handmade metal articles. Their persistent attempts to duplicate or match the excellent design and sturdy strength of commercially produced metal pieces has been recognized and greatly aided by the publication of numerous texts and magazine articles pertaining to metal crafts. With but few exceptions these publications have adequately covered the tool processes and construction practices involved. A few directions on peening, scroll making, and finishing metalwork may be helpful, however.

Peening

The effect shown at *A*, illustrated on page 432, was obtained with the ball of the ball-peen hammer.

At *B* is shown the effect of using the cross-peen of a riveting hammer.

The marks shown at *C* were produced by striking in such a manner that ½ to ¾ of the hammer face was embedded.

The effect shown at *D* was produced by striking the metal with the edge of the hammer face.

At *E* are shown the markings produced by merging blows made with the cross-peen of a riveting hammer.

The designs shown from *F* to *P* inclusive were produced with cold chisels, and center punches.

Scrolls

The spiral scroll

1. Flare end.
2. Curl end over anvil or vise.
3. Begin with curled end, bending outward and around in a circle of ever increasing radius.

The reversed scroll

1. Flare end.
2. Curl *A*.
3. Curl *B*.

The riveted scroll

1. Flare end.
2. Bend loop, starting at flared end.
3. Drill hole and rivet.

The barbed scroll

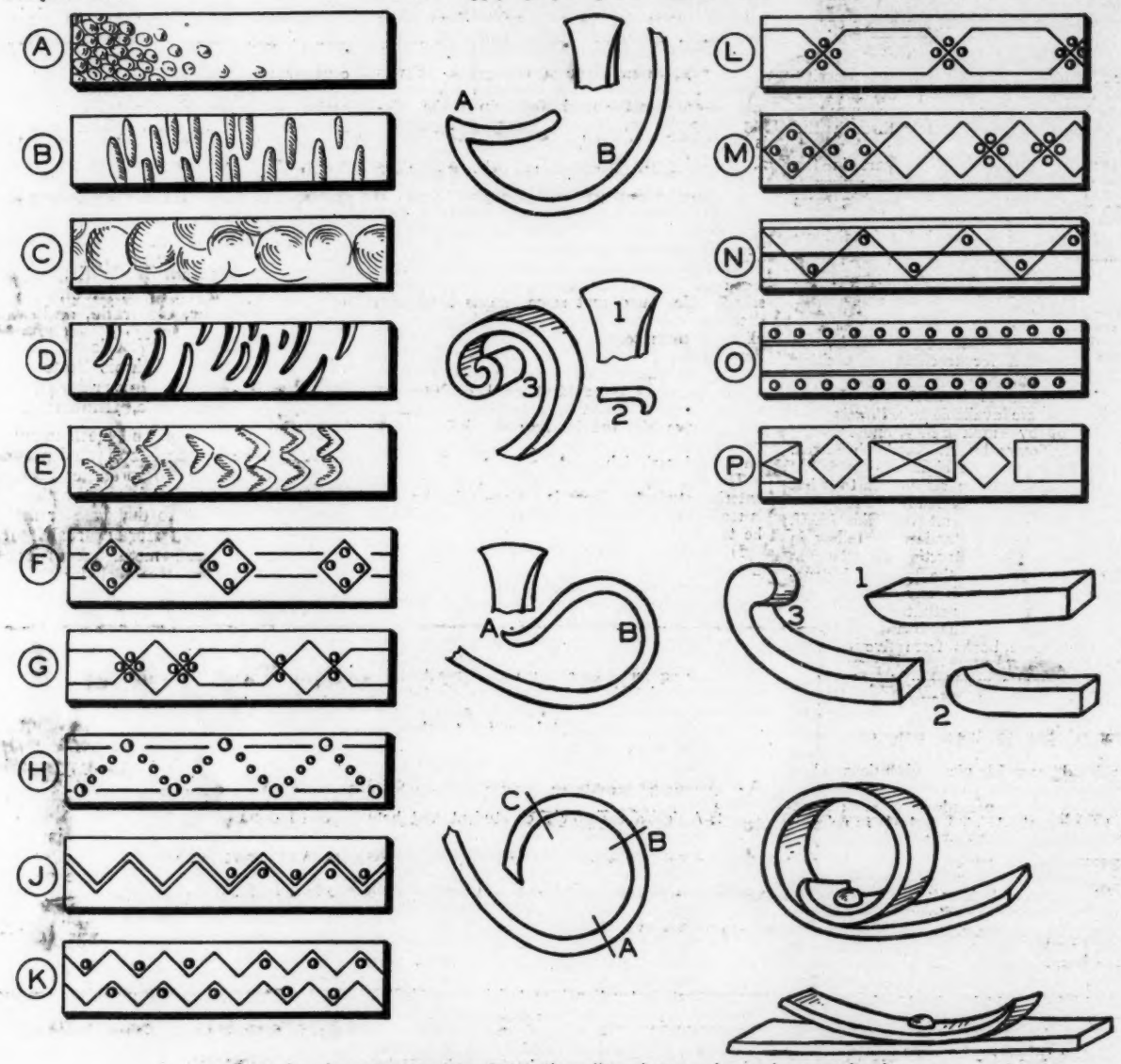
1. Flare end.
2. Bend *A*.
3. Bend *B*.

The simple curve

This may be used where a scroll lends too much bulk to the design.

End scroll for square stock

1. Grind or hammer one side round.
2. Curl end slightly.
3. Complete scroll.



Examples of peening, ornamenting, and scrolling that may be used on metalwork

Cold iron scrolls

Try varying the ends by terminating the scroll at *A*, *B*, or *C*.

All of these scroll forms are adaptable to flat, round, or square iron.

Appropriate Finishes

Paint — flat, gloss, enamel, or lacquer.

Apply with brush or spray gun. On plain surfaces a touch of bronzing powder of contrasting color blown on here and there will enhance the appearance. On peened or chiseled surfaces, the paint may be rubbed away leaving the color only in the decorative markings.

Choose a colorful finish in harmony with the color scheme of the room.

Wax — furniture, floor, or car wax.

Remove undesirable rust, discoloration and foreign matter from the metal surface with mill file and emery cloth. Apply wax in thin coats with cloth. Rub to polish with dry cloth.

This produces rustproof, clear satin finish on the metal.

Hammered

Remove rust and discoloration from metal surface. Apply proper peened effect with hammer. Color piece with heat or paint. Bring out high lights by rubbing with medium emery cloth. Apply thin coat of wax, clear varnish, lacquer, or oil.

This will produce an antique effect resembling the hammered finish of old hand-forged work.

Bright

Use mill file and emery cloth in removing blemishes from metal surface. Polish smooth with steel wool. Apply wax or clear lacquer to prevent rust.

This smooth, natural metal color finish is very attractive, especially on modern designs.

Heat — with or without a previous coat of oil.

Subject the metal to a smokeless, directed flame until the desired color appears. Cool metal and apply protective coat of wax. By applying directed heat to certain parts or points on the metal, a variety of effects can be obtained.

This is a new and unusual finish, which looks well on wall brackets, whatnot frames, and light fixtures.

Smoked

Apply a coat of oil and heat metal until oil ignites. The resultant coat of oily soot protects the metal from rust.

This produces a nondecorative, cheap, temporary protective finish.

Lacquer or Varnish

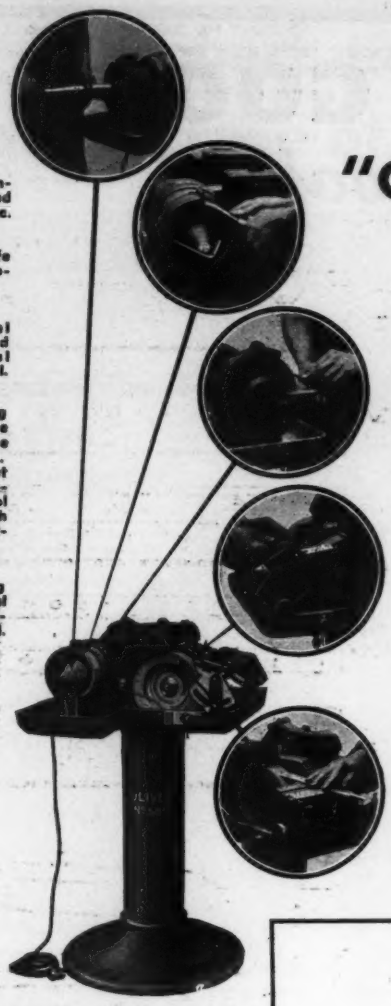
Prepare the surface decoration over which the lacquer is to be applied. Apply a single thin coat with brush or spray gun.

The protective finish thus obtained does not detract from the surface decoration.

Chemical, brass and copper.

Immerse or wash the piece in diluted solution of sodium bisulphide, potassium bisulphide, acetic acid, nitric acid, or other chemicals with which you may wish to experi-

(Continued on page 18A)



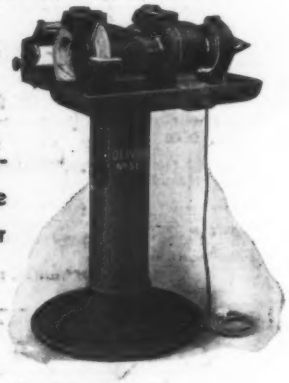
1. Grinding inside curved tool on cone.
2. Sloyd knife being stropped.
3. Cold chisel being ground on general utility wheel.
4. Grinding jack-plane bit on coarse oilstone. Tool held at correct angle by tool holder with screw adjustment.
5. Grinding skew-chisel on fine oilstone wheel.

The "New Orleans" Model of the "Oliver" Oilstone Tool Grinder

This compact, portable, variety grinder operates from a light socket and efficiently handles practically every tool grinding operation encountered in the school shop. It was developed in close cooperation with the supervisor of Manual Training of the New Orleans parish school board. After introduction into the schools there, the administrators found that the grinder fitted their requirements so well that today 62 schools in that locality are using it.

A satisfied supervisor wrote:

"The various safety features and the elevated table place the "Oliver" Oilstone Tool Grinder far in advance of any other similar grinding machine on the market."



A Few of the 62 New Orleans Schools Using the "Oliver" Grinders

Allen
Capdau
Beauregard
Kruttschnitt
Laurel
Milne Municipal Boys' Home
Washington
Hoffman
Jones
McDonogh Schools
Nelson

"Oliver" No. 384 Variety Tool Grinder

(Motor Driven)

An efficient machine, especially adapted to smaller school needs incorporating most of the features of the No. 585 model, smaller and less costly. Features are: automatic saturation system, oilstone wheels, emery wheel, tool rest, and eye-shield.

"Oliver" Wood Trimmers

A trimmer which will square up ends of moulding or larger work quickly. Using a plane and square all day will not perfect a joint as well as a few strokes of an "Oliver" wood trimmer. Saves time and trouble.

"Oliver" Woodworking Machines

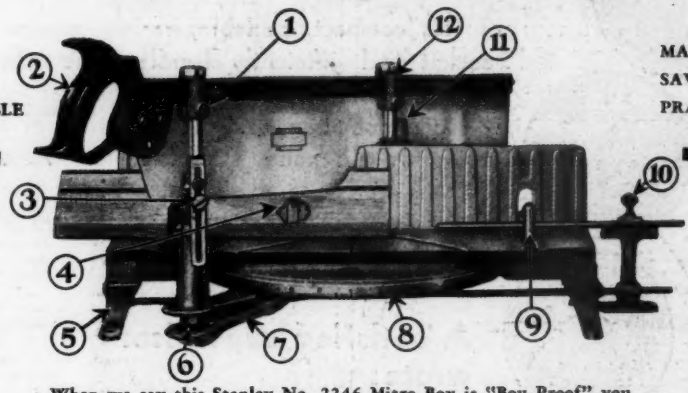
Circular Saw Benches
Cut-Off Saws
Wood Lathes
Surface Planers
Oilstone Tool Grinders
Wood Trimmers
Band Saws
Band Saw Brazers
Jointers
Mortisers
Boring Machines
Jig Saws
Sanders
Shapers
Glue Heaters
Vises

Write for Specifications, Literature, and Prices.

Oliver Machinery Company
Grand Rapids, Michigan, U.S.A.

IT MUST BE GOOD
to be "Boy Proof"

MALLEABLE IRON
SWIVEL AND UPRIGHTS
CAST IN ONE PIECE.
PRACTICALLY UNBREAKABLE



MALLEABLE IRON
SAW GUIDES
PRACTICALLY UNBREAKABLE

CHECK!

1. Two roller bearings in each saw guide produce smooth saw action.
2. First quality back saw.
3. Positive saw guide stops and depth stop plates control depth of saw cut. Serrated teeth on uprights and stops withstand severe use.
4. Adjustable spurs in back keep work from slipping.
5. Detachable legs of malleable iron are practically unbreakable.
6. Swivel lever and lift screw automatically raise front saw guide and saw out of kerf cuts when changing swivel position.

When we say this Stanley No. 2246 Mitre Box is "Boy Proof" you know it *must* be good . . . free of weak spots . . . rugged construction . . . simplified design with minimum number of parts. Because Stanley has engineered all those qualities into the tool along with high accuracy, this is a favorite mitre box among school shop instructors. Check over its many fine features. Write for Catalog 34, describing the Stanley line of Tools.

CHECK!

7. Swivel and uprights cast in one piece of malleable iron. Practically unbreakable.
8. Quadrant is graduated in degrees and is also numbered for sawing, 3, 4, 5, 6, 8, 12, 24 sided figures. Double locking, self-clamping swivel locks at any point of the quadrant.
9. Stock guides hold work tightly against the back.
10. Length stop for duplicate work.
11. Automatic saw guide catches hold saw above work while putting work in proper position.
12. Saw guides of malleable iron practically unbreakable.

EDUCATIONAL DEPT. **STANLEY TOOLS** NEW BRITAIN, CONN.
DIVISION OF THE STANLEY WORKS

(Continued from page 432)

ment. These chemicals cause the surfaces to take on certain colors or give a mottled effect. Wash in water and apply a protective coat of wax.

This type of finish with its mottled shade of green and red is a pleasing change from the usual color found on brass and copper.

Graphite paint

Clean off all foreign matter and apply one or two coats of graphite paint with a brush. This finish is used on porch railings, balcony railings, porch lanterns, and other outside ironwork.

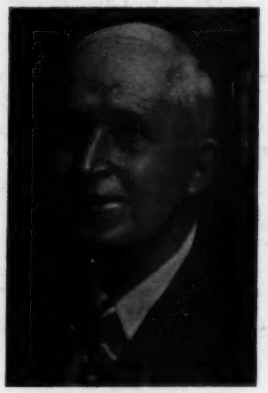
This finish closely resembles the finish commonly seen on commercially made outside ironwork.

PERSONAL NEWS

Kenneth G. Smith Dies

Kenneth G. Smith, long considered Michigan's "Grand Old Man" in vocational education passed away September 11, 1940, in Lansing, the community in which he had made his home for the last twenty years of his life. Although in failing health for some time, "K. G." as he was known to nearly all vocational educational people, never lost his keen interest, appreciation, and intimate contact in all matters relating to the vocational education program and although his ill-health was quite generally known, his death came as a distinct shock to all who knew him.

A graduate engineer of Chicago University, Mr. Smith obtained employment at the Westinghouse Co., later becoming shop superintendent and erecting engineer for the Kerr Turbine Co., Wellsville, N. Y. His career in the educational field began in 1908 at which time he taught extension classes at the University of Wisconsin. It was during this period that Mr. Smith's mathematical text *Shop Arithmetic*, the first book of its kind published in this country so far as we know, made its appearance. Other experiences included the organ-



K. G. Smith

ization of industrial classes in many industrial plants of Milwaukee, organizing courses for men in the nation's shipyards during the World War, and directing industrial training at United States army camps.

At the close of the war Mr. Smith became professor of trades and industries at Iowa State College, during which time lesson material in various occupational fields was developed. Outstanding service led Mr. Smith to the Federal Board for Vocational Education in which he served as regional agent. This position was continued until 1920 when Mr. Smith was appointed state supervisor of trade and industrial education for the state of Michigan, a position which he held until ill-health forced him to retire two years ago.

A tireless worker in the interest of youth, Mr. Smith was instrumental in the development of equal educational opportunities for all youth. His interest in youth led him beyond his work-a-day activities and for ten years he was superintendent of the church school at St. Paul's Episcopal church in Lansing.

Former associates and assistants served as pallbearers, and a long array of vocational educational executives in attendance at Mr. Smith's funeral was a fine indication of the high esteem in which he was held by the people with whom he worked — those who knew him best.

Student, engineer, worker, teacher, and friend, member of Phi Beta Kappa, Phi Delta Kappa, Tau Beta Phi, and Sigma Xi fraternities, Mr. Smith's wholesome friendliness and breadth of knowledge in vocational fields will long remain an inspiration in the memory of his former associates and friends. — *D. V. Duryee*, Supervisor, Trade and Industrial Education, Michigan State Board of Control for Vocational Education.

Dr. William A. Brandenburg Dies

Dr. William A. Brandenburg, president of the Kansas State Teachers College, Pittsburg, Kans., died on Oct. 29 at a St. Louis hospital where he had gone for treatment five weeks earlier.

Dr. Brandenburg was born in Clayton County, Iowa, Oct. 10, 1869.

He received the Ph.D. and M.A. degrees from Drake University, Des Moines, Iowa, and the LL.D., degree from Monmouth in 1925.

He was superintendent of Capital Park Schools, Des Moines, from 1900–05; superintendent of schools, Mason City, Iowa, 1905–10; superintendent of schools, Oklahoma City, Okla., 1910–13; and has occupied the position of president of Kansas State Teachers College, from 1913 to the time of his death.

Probably Dr. Brandenburg may be best de-

(Continued on page 20A)

This chart makes it easy to select the right grade of plywood for every project

Write now for a chart to hang up in your room!

This handy wall chart contains this information: (1) Descriptions of the 5 standard grades of Douglas Fir Plywood. (2) Large "grade trade-marks" so that students can easily learn and recognize them. (3) Uses of the various grades. (4) Actual size wash drawings of panels showing the stock thicknesses. (5) Lists of stock lengths and widths. You and your students will find yourselves referring to this chart every time a project calls for Douglas Fir Plywood. Send for it now. It's free.

● Douglas Fir Plywood is the most versatile wood you can have in your stockroom. It combines large size with light weight and amazing strength. Its refusal to split makes it as ideal for beginners' coping saw projects as for the most advanced students' cabinet work.

Douglas Fir Plywood is easy to work with all tools. It holds nails and screws firmly at the very edge. It can be bent to pleasing curves. Its satin-smooth surface takes any finish, but is most attractive when the grain is visible but subdued.

You will find that a supply of all the Douglas Fir Plywood grades, listed at right, in your stockroom will stimulate students' enthusiasm and ideas. For this "modern miracle in wood" invites experiment—turns out a neat, well-finished project because it's boy-proof. Order from your dealer today. And remember . . . specify the grades you want by the Douglas Fir Plywood "grade trade-marks."

PLYPANEL The grade of Douglas Fir Plywood for fine cabinet work, cut-outs, paneling — every project where both sides of the plywood are to be finished and exposed to view.

PLYWALL The wallboard grade of Douglas Fir Plywood. Use it for display cut-outs, backs of cabinets, light shelves, partitions, etc., where only one surface must be perfect. Builds puncture-proof walls and ceilings.

PLYSCORD Use this grade for sheathing, sub-flooring and wherever strength and rigidity but not perfect surfaces are required.

PLYFORM Excellent concrete form material. Serves as sheathing and lining combined. Gives smoother surfaces at lowest cost.

EXT-DFPA This type of Douglas Fir Plywood is made with water-proof glues for permanent outdoor work such as garden cut-outs, siding, signs, bird houses, etc. Ideal for all types of boats.

FREE PLANS The Douglas Fir Plywood Association in cooperation with some of the nation's leading naval architects is now offering plans for 5 sizes of boats to be built of EXT-DFPA, the outdoor grade of Douglas Fir Plywood. The boats are: 15-ft. knockabouts; 20-ft. sailboat; 11½-ft. skiff; 9-ft. skiff; 8-ft. pram-dinghy. Complete plans, specifications and directions for any of these are free. Also very useful are Finishing Booklet and Grade Use Guide. For any of this material or the handy wall chart described above, write Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D F P A INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D F P A INSPECTED

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D F P A

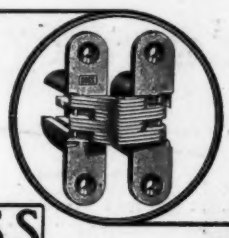
DOUGLAS FIR PLYWOOD

Real Lumber

MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

Teach Your Student— Carpenters and Cabinetmakers

The new modern way to creations with a really professional touch.



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give a touch or effect unobtainable with any other type of hinge and at the same time are easily installed giving to the lid or door a roller bearing ease of movement.

Write for details today

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USE **AETNA** PLYWOOD
FOR YOUR SCHOOL SHOP PROJECTS

You can fill all your school shop needs from our diversified stock. Here is a list of items which you will find suitable for many projects:

PLAIN WALNUT (For cutting small sizes)
This ¼" 3-Ply material ranges in width from 24" to 48". Lengths vary from 27" to 72", and you can be sure of finding the size you need.

WALNUT CEDAR CHEST SETS
Each set consists of two panels for sides and ends, and two panels for the top and bottom. A chest made from these 13/16" 5-Ply panels is both practical and economical.

FIR—EXT-DFPA (Waterproof)
This **permanently** waterproof item is ideal for all exterior purposes whether you are building bird-houses or boats. It is grade-marked EXT-DFPA by the Douglas Fir Plywood Association so that **you know** it's waterproof.

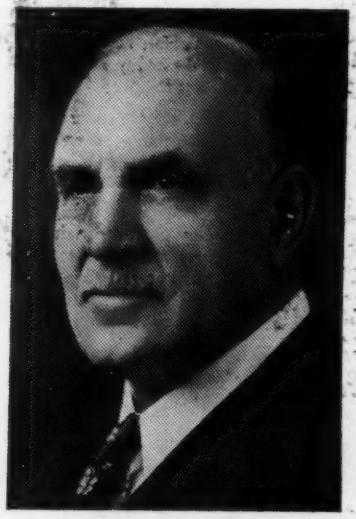
GUM BENDING PANELS
You can order either 1/10" 2-Ply or 1/8" 3-Ply bending Gum plywood in a variety of widths and lengths. This wood takes a fine paint finish, and it's easy to work with.

Oak, Mahogany, Pine, Birch, Basswood, and many other woods are standard stock items in our Chicago warehouse. Don't hesitate to write us when you need plywood in a hurry—your order will be shipped the same day it is received, so call or write AETNA for all kinds of plywood!

AETNA PLYWOOD & VENEER
1731 Elston Ave. Phone ARMitage 7100 Chicago, Ill.

(Continued from page 18A)

scribed by quoting the following written by his co-worker, William T. Bawden, head of the department of industrial and vocational education, Kansas State Teachers College:



Dr. William A. Brandenburg

"In the death of President William A. Brandenburg we have sustained an irreparable loss not only for Kansas State Teachers College, but for the cause of industrial education. A man of great energy and force of character, keen insight, sound judgment, and the courage of his convictions he had achieved a place of commanding influence in the educational councils of the nation. For years a foremost leader in his adopted state of Kansas, he held office or membership on important committees in the National Education Association, the American Association of School Administrators, the North Central Association of Colleges and Secondary Schools, and the American Council on Education. The latest honor in which he took justifiable pride was his election last year to the presidency of the American Association of Teachers Colleges.

"In his personal relations he was uniformly friendly, courteous, and considerate, always accessible to students and members of the faculty alike. To a remarkable degree he held the esteem and affection of all.

"As head of one of the major departments of the college, I had many evidences of his grasp of administrative problems, his breadth of understanding of the problems of public education in all its phases, his comprehensive knowledge of men, institutions, and movements, and his remarkable ability to translate ideas into concrete form, or, as we say, to get things done. With all his vital interest in the practical side of public education — especially in industrial arts and vocational education — he nevertheless saw all phases of education in their relationships, maintained a sure sense of values and perspective, and devoted his life to the development of what has now become one of the great educational institutions of the country."

Lynn E. Stockwell Dies

The Division of Vocational Education of the University of California, which is conducted as a cooperative enterprise between the State Department of Education and the University of California, has sustained a great loss in the death of Lynn E. Stockwell last August. In the field of conference training it is doubtful if there was to be found a more effective leader in this country. He had a peculiar grasp of the relationships between the trade and industrial-training work of the State Department of Education and the industrial plants of California. This was indicated by the many calls upon his time to carry on extension work right in the industrial plants. Evidence of the effectiveness of his leadership has had universal expression in industry.

Mr. Stockwell was born in Wisconsin, July 31, 1892. Following high school preparation he became a student at Stout Institute at Menomonie, graduating in 1913. He entered the University of Minnesota and received therefrom the B.S. degree in education in 1920, the M.A. degree in 1922. Later he furthered his education by taking additional graduate work at the University of Minnesota and by attending the University of California intermittently from 1925 to 1933.

Mr. Stockwell began his teaching in Minnesota as head of the manual-training departments in several high schools. His success in this work led to his being called to the University of Minnesota as lecturer in the division of industrial education and head of the manual-arts department in the University High School. In these positions he served for more than seven years.

Coming to California in 1925, Mr. Stockwell became assistant supervisor of trade and industrial teacher training at the University of California at Los Angeles and automatically a member of the staff of the division of vocational education of the university. From this position he was called to Fresno as director of trade and industrial education in the Fresno State College. In connection with this position he was given the supervisorship of all the industrial and vocational work in the Fresno city schools. Here he rendered a nine years' service of exceptional character. Again he was called to the Berkeley Campus of the University of California to accept the position of supervisor of trade and industrial teacher training and lecturer in education.

During his tenure of positions on either campus of the University, Mr. Stockwell was always in

(Continued on page 23A)

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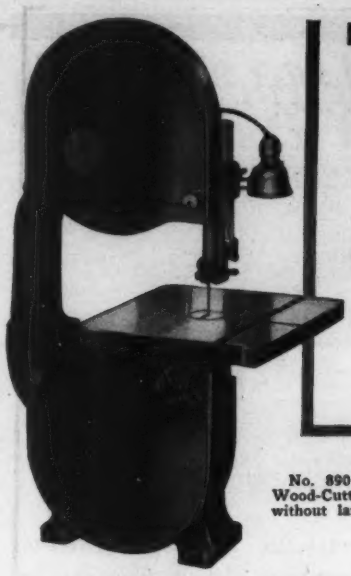

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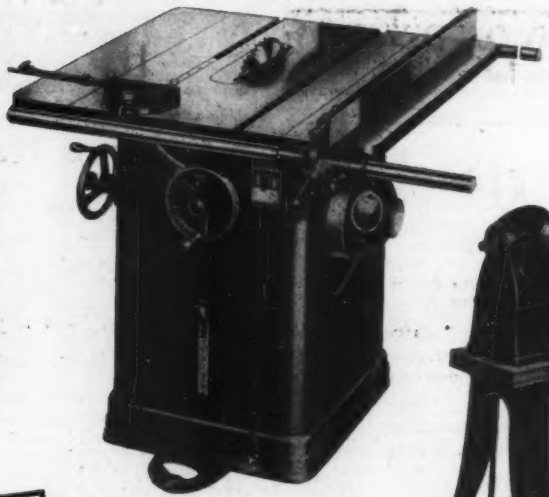

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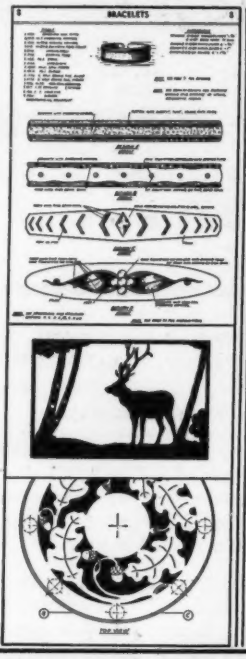

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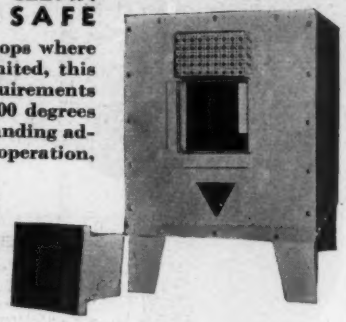

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(Continued from page 20A)

great demand as a lecturer, consultant, and leader in matters dealing with the problems arising out of the ramifications of the Smith-Hughes Program and especially the California plan for trade and industrial education. In such work he proved himself a worthy associate of Mr. J. C. Beswick, chief of the bureau of trade and industrial education of the state department of education.

During his lifetime Mr. Stockwell contributed many articles to industrial-arts magazines, but in this line he will be best remembered for his series of reports of conference training in the fields of public service, organized labor, and such industries as aviation, printing, oil refining, garment manufacture, building materials, sugar refining, glass, and steel.

Mr. Stockwell was a member of several educational associations and had been state secretary-treasurer of the California Industrial Education Association for several years. He held memberships in two national honor fraternities, namely Phi Delta Kappa and Epsilon Pi Tau.

In community affairs, Mr. Stockwell took a very active interest in the work of the Boy Scouts of America. At the time of his death he was committeeman for Sea Scout Ship No. 35, where his two sons are members. In fact, at the scout Jamboree of 1935, held in Fresno, Mr. Stockwell had the unique honor of receiving his eagle scout badge in company with his two sons, William and Richard, who, with Mrs. Stockwell survive him. —*W. W. Kemp*, Professor of Education and Director of the Division of Vocational Education.

♦ HAROLD T. WIDDOWSON, assistant professor of industrial education at the University of Minnesota, has been granted leave of absence until June 15 to serve under the U. S. Office of Education, Vocational Division, in a supervisory capacity, within the national defense training program.

♦ GORDON O. VOSS, Proctor, Minn., formerly state supervisor of trade and industrial education, will assume the duties as teacher trainer at the University of Minnesota during the temporary absence of Harold T. Widdowson.

♦ JOHN B. COLEMAN, Director of the La Crosse Vocational and Adult Schools, La Crosse, Wis., recently has been appointed educational consultant for the architectural firm of Boyum, Schubert, and Sorensen. Mr. Coleman has had firsthand experience with some nine or ten school-building programs besides conducting adult schools and classes in numerous buildings.

♦ L. E. FALGREN, supervisor of industrial education, Kansas City, Kans., has been appointed recently to act in the capacity of evening school director. During the past summer, Mr. Falgren has supervised the national defense training program. He will also continue to serve in this position.

♦ HOWARD E. HEDINGER, for seven years industrial-arts instructor in the York and Sharon Township Schools of Medina County, Ohio, has been appointed to direct and develop the new industrial-education department consisting of a drafting department and general shop, in the Senior High School of Sharpsville, Pa. Mr. Hedinger was a coach and teacher of mathematics and science for five years before entering the industrial-arts field.

♦ URWIN ROWNTREE, Area Co-ordinator of industrial education with office at the Pennsylvania State College, has been appointed chief of the division of industrial education for the Commonwealth of Pennsylvania, effective November 1. Prior to Mr. Rowntree's appointment as an Area Co-ordinator over a territory covering about one sixth of the State, he was director of vocational education at Hershey, Pa.

♦ E. H. BAILEY, former shop-theory instructor of the Henry Ford Trade School, Dearborn, Mich., has accepted a position as instructor and co-ordinator of the school shop for the Big Rapids High School, Big Rapids, Mich.

♦ A. M. WAGENER, has taken over Mr. Bailey's shop-theory classes at the Henry Ford Trade School, Dearborn, Mich. Harold Young succeeds Mr. Wagener as apprentice school instructor.

♦ WILLIAM H. COTTER, JR., has been appointed Acting State Youth Administrator for Rhode Island, temporarily succeeding Peter E. Donnelly who has been called to the colors as a captain with the R. I. National Guard.

Mr. Cotter graduated from Rhode Island State College in 1933. In 1935 Mr. Cotter was employed by the Rhode Island Department of Agriculture and Conservation as Executive Secretary to the Director, a position he held until December, 1939. In 1936 and 1937 he served as a member of the State Advisory Committee of the National Youth Administration. Mr. Cotter is familiar with youth organizations and his experience includes supervision of playgrounds and boys club activities in South Kingston, R. I., and work with the Boy Scouts of America in Wakefield, R. I.

♦ LEONARD E. FORST, former carpenter-shop instructor of the St. Paul Vocational School, St. Paul, Minn., died on October 11 following a short illness.

Mr. Forst came to St. Paul in 1903 and entered the St. Paul school system in 1910. He taught at the Madison School until the St. Paul Vocational School was built in 1923, at which time he joined the staff and was very active in the work of the school.

♦ NEIL J. F. VAN STEENBERG has been appointed assistant director of the Division of Youth Personnel of the National Youth Administration.

Mr. Van Steenberg is a graduate of the University of Manitoba, was subsequently employed as a construction engineer with the Canadian Pacific Railroad, and later completed work for his doctorate in psychology at the University of Chicago.

From 1936 to 1939 Mr. Van Steenberg engaged in teaching work at the University of Utah where he held the position of assistant professor of psychology. For the past year he was conducting post doctorate research at the University of Iowa on a fellowship grant made available by the Carnegie Foundation.

♦ SAM F. HALL has been given supervision of the high school automobile-driving course just introduced at Clayton, Mo. Ralph Harris will be the instructor.

(Continued on page 24A)

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(Continued from page 23A)

♦ C. H. MARSHALL will teach the new class in shop and sheet-metal work which will be offered for the first time at the high school in Manhattan, Kans.

ASSOCIATION NEWS

THE AMERICAN VOCATIONAL ASSOCIATION CONVENTION

When the members of the American Vocational Association assemble at historic San Francisco for their annual convention, they will be confronted by a program which will well repay those who have come from the far corners of the United States.

The *National Association of State Supervisors of Industrial Education* will meet at 9:30 a.m. on Saturday, December 14, to discuss recent developments in the national defense training program, under the chairmanship of Tom Watson, state supervisor of industrial and distributive education, Boise, Idaho.

At 7 p.m., under the chairmanship of Tom Watson, the duties and responsibilities of state supervisors of trades and industries will be discussed, as will also standards for trade and industrial education, and the extent of the cooperation between state and N.Y.A. programs.

At 9:30 a.m. on Sunday, the questions on how to develop better public relations; more effective programs; and county, regional, or state trade schools; will be taken up. Tom Watson will be the chairman at this meeting.

At 2 p.m. a business meeting will be held at which Mr. Watson will preside. At this time the research committee will make its report, and the new officers for the coming year will be elected.

The *National Council of City Administrators of Vocational Education and Industrial Arts* will hold a dinner meeting at 6:30 p.m. at which Howard A. Campion, assistant superintendent of schools, Los Angeles, will preside.

At this meeting a panel discussion on the administrative problems arising out of the national defense training program will be held. The panel members are Howard A. Campion, Franklin J. Keller, Benjamin W. Johnson, Ronald W. Kent, and Charles F. Bauder.

The *Trade School Principals Association* will hold a luncheon meeting at 12:30 p.m. on Monday, December 16. President Franklin J. Keller, principal, Metropolitan Vocational High School, New York City, will preside.

A panel discussion in internal administrative problems arising out of vocational education for national defense will follow. Leslie G. Stier, principal, Frank Wiggins Trade School, Los Angeles, will be the chairman, and the panel members are Ben A. Bernard, Paul Essert, O. B. Badger, G. B. Trimble, Charles Frazier, Lillian Van Loan, Irvin N. Noall, Homer Fetty, A. R. Nichols, and George C. Ford.

The *Vocational Guidance Section* will hold its first session at 9:30 p.m. on Monday, December 16. J. C. Beswick, assistant executive officer and chief, Bureau of Trade and Industrial Education, State Department of Education, Sacramento, Calif., will be the chairman. The subjects for discussion are, "Functions of State Vocational Guidance Programs," "The Organization of a State Vocational Guidance Program," and "Operating a State Vocational Guidance Program"; and the speakers are: Harry A. Jager, Royce E. Brewster, from the U. S. Office of Education; and Roy N. Anderson, Teachers College, New York City.

The chairman of the Tuesday morning session will be Gilbert Cuthbertson, director of Vocational Education, St. Joseph Public Schools, St. Joseph, Mo.

The subjects for discussion are, "Dunwoody Advisement Training and Testing in the Previous World War and in the Present National Emergency," "Prescribing and Testing the Training of Industrial Employees," and "Guidance Activities of Advisory Committees"; and the speakers are: R. T. Craigo, from the Dunwoody Industrial Institute, Minneapolis, Minn.; Graham R. Miller, Opportunity School, Denver, Colo.; and H. A. Tiemann, state director of vocational education, Denver, Colo.

The session on Wednesday morning will be presided over by Edwin A. Lee, University of California, Los Angeles. "Counseling Procedures of Industrial Arts Teachers," "Counseling Procedures of Vocational Teachers," and "Placement of Inexperienced Workers," will be the subjects for discussion; and the speakers are: Louis V. Newkirk, Chicago, Ill.; Emily G. Palmer, University of California, Berkeley, Calif.; and Creighton E. Hays, supervisor of the Denver Occupational Adjustment Service, Denver, Colo.

The chairman at the Vocational Guidance luncheon on Wednesday at 12:15 p.m. will be Ralph H. Woods, vice-president for vocational guidance, State Department of Education, Frankfort, Ky. C. A. Prosser, director, Dunwoody Industrial Institute, Minneapolis, Minn., will be the main speaker.

The first session of the *Industrial Arts Education* section will be held on Monday, December 16, at 9 a.m.

The theme for this meeting will be "Coordinating Relationships of Industrial Arts." Lawrence F. Ashley, chief, division of vocational education, Yonkers, N. Y., has been appointed chairman, and the speakers, William T. Bawden, Heber A. Sotzin, and F. Theodore Struck, will discuss the following topics, "A Living-and-Learning Philosophy," "A Leavener of School Curricula," and "A Service to Modern Industry."

Otto A. Hankamer, professor, department of industrial and vocational education, Kansas State Teachers College, Pittsburg, Kans., will be the chairman for the Monday afternoon session, the

(Continued on page 27A)

Going West?

San Francisco, California, is the city opening its doors this year to visitors at the American Vocational Association meeting—the dates, Dec. 16 to 18, inclusive.

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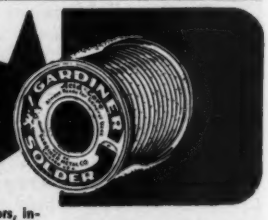

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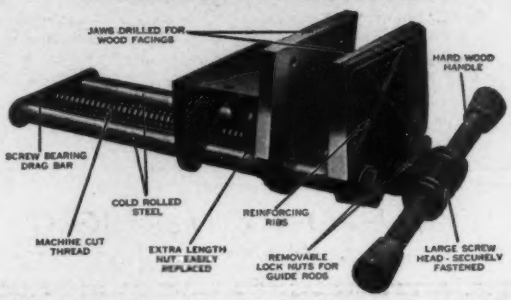
COLUMBIAN VISES

Woodworkers'


JAWS DRILLED FOR WOOD FACINGS
HARD WOOD HANDLE
SCREW BEARING DRAG BAR
COLD ROLLED STEEL
REINFORCING RIBS
MACHINE CUT THREAD
EXTRA LENGTH NUT EASILY REPLACED
REMOVABLE LOCK NUTS FOR GUIDE RODS
LARGE SCREW HEAD - SECURELY FASTENED

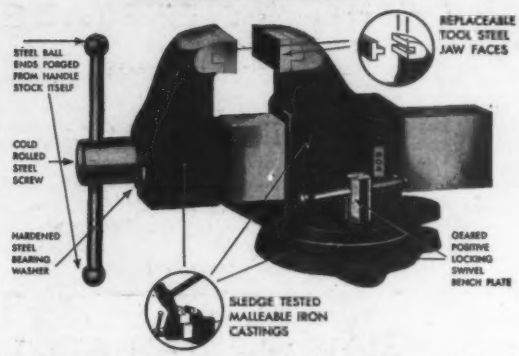
COLUMBIAN Rapid Acting Woodworkers' Vises are designed for school and industrial shops where time is an important factor. Especially adaptable where large changes in jaw opening must be made frequently.

Simple rapid acting mechanism consists of a bronze half-nut operating in the groove produced by milling off a section of each thread for the length of the screw. A slight turn of the handle engages the threads of the nut and screw, and a half turn tightens the vise on the work.

Columbian Continuous Screw Woodworkers. Vises are simple in design, rugged in construction and practically "fool-proof." They can be furnished with either wood or steel handles.

The Columbian Line also includes Combination Pipe Vises, Hinged Pipe Vises, Garage Vises, Bench Anvils, and "C" Clamps. Write us for complete catalog and name of the Hardware or Industrial distributor carrying Columbian Vises in stock.

Machinists'


REPLACEABLE TOOL STEEL JAW FACES
STEEL BALL ENDS FORGED FROM HANDLE STOCK ITSELF
COLD ROLLED STEEL SCREW
HARDENED STEEL BEARING WASHER
GEARED POSITIVE LOCKING SWIVEL BENCH PLATE
SLEDGE TESTED MALLEABLE IRON CASTINGS

COLUMBIAN Malleable Iron Machinists' Vises are designed to give the service required of quality tools. Guaranteed not to chip, crack, or break.

JAW FACES of hardened tool steel, pinned securely so that they will not come loose in use, can be replaced.

STEEL SCREW and MALLEABLE IRON NUT are designed to give maximum strength. A hardened steel thrust washer under the screw head prevents wear and eliminates end play. STEEL BALL ENDS on the handle are forged from the handle stock itself, and will not come loose.

SWIVEL BASE VISES are locked in any position by a forged steel lock bolt, and steel clamping nut.

BASES on all Columbian Machinists' Vises are machined flat to permit solid mounting and eliminate cutting bench tops.

THE COLUMBIAN VISE & MFG. CO.

9017 Bessemer Ave. - CLEVELAND, OHIO

(Continued from page 24A)

theme of which is, "The Industrial Arts Teacher on Today's Frontier." The following speakers, Lynn C. Monroe, William T. Bawden, and Omar B. Badger, will speak on the subjects, "Selection of Candidates for Teaching," "Preparation for Teaching," and "Improvement of Instruction."

The Tuesday morning session will be presided over by Louis V. Newkirk, director, Bureau of Industrial Arts Education, Chicago, Ill. The theme for this meeting is "Industrial Arts in the Elementary School." The speakers, Heber A. Sotzin, Kenneth F. Perry, George B. Cox, and John J. Metz, will discuss the following phases of the subject, "Industrial Arts in the Pacific States," "Industrial Arts in the Mountain States," "Viewpoint in the Secondary School," and "The Viewpoint of Publishers."

Kenneth F. Perry, professor of industrial arts, Colorado State College, Greeley, Colo., will preside over the Wednesday morning session at which "The Expanding Scope of Industrial Arts" will be discussed. Emanuel E. Ericson and R. B. McHenry will speak on "The Purpose and Nature of Expansion" and "The Problems of the Arts and Crafts."

The business session will follow this meeting.

Homer J. Smith, A.V.A. vice-president for industrial arts, and professor of industrial education, University of Minnesota, Minneapolis, Minn.; and Arthur B. Mays, industrial-arts representative on the Editorial Board and on the Central Research Committee of the A.V.A., and professor of industrial education, University of Illinois, Urbana, Ill., will make their progress reports.

At the industrial-arts luncheon Wednesday at noon, Charles E. Barker, director of industrial arts and vocational education, San Francisco, Calif., will be the chairman and Roy A. Hinderman, director, department of research and special school services, Denver, Colo., the toastmaster. While our genial vice-president, Homer J. Smith, says there will be no theme, no topics, and no business, nevertheless, there will be short statements made by the following, Lindley H. Dennis, Verne C. Fryklund, Arthur B. Mays, John J. Metz, and F. Theodore Struck, thereby terminating another well-planned series of A.V.A. industrial-arts sessions.

♦ The School Crafts Club of New York City held its October meeting at the Hotel Imperial and elected the following officers for the ensuing year: president, David Berger; vice-president, Oscar F. Raab; secretary, Robert Heath; treasurer, Garson Goldberg; program chairman, Harvey E. Perry.

Perry Schneider, a former president of the club, showed an excellent film, "Veneering for the Homecrafter" which had been furnished by the Albert Constantine Co., of New York City.

The next meeting will be held on November 16 at the Hotel Imperial, and arrangements are being made for a surprise program. — *Allen S. MacGregor.*

♦ Over 80 members of the Long Island Industrial Arts Teachers' Association gathered for their September meeting at Valley Stream, L. I., for a dinner and round-table discussion sponsored by the Valley Stream Board of Education. Kenneth Darling, Ed Furrier, and Stanley Michaels, local shop teachers, served as hosts.

The discussion theme was "National Defense as it Concerns Industrial Arts Teachers," and the speakers included Harry Page, Lawrence, L. I., director of the National Defense Program at Lawrence; Clarence Jenner, director of National Defense Program at Freeport; and Kenneth Gregory, director of National Defense Program at Great Neck, N. Y.

♦ Another national organization, the American Library Association, has now affiliated with the National Commission on Cooperative Curriculum Planning, according to an announcement by the commission chairman, John J. DeBoer. Representing the A.L.A. at the meetings of the Commission is Miss Mildred L. Batchelder, executive secretary of the association. Miss Elizabeth L. Scripture, director of school libraries in Denver, is chairman of the committee preparing the association's section of the commission's first report.

The National Commission consists of delegates from 20 national organizations representing teachers in nearly all the special subject fields. In most cases the delegates are officers of their organizations or chairmen of important committees.

♦ The Maine Industrial Arts Teachers Association held their annual meeting on Oct. 24 and 25.

The meetings were planned to be of direct help to the teacher in his shop. For this reason, besides departmental meetings, there were demonstrations on bookbinding, metal spinning, the silk-screen process, and the use of motion pictures.

♦ The Industrial Arts Teachers of Nassau and Suffolk Counties, N. Y., met October 8 at the Rivoli Theatre to hear Ruth Bryon Owen speak on "This Business of Diplomacy." After the address industrial-arts teachers met for dinner at the Cathedral Avenue School in Garden City, with John N. Willmott, supervisor of industrial arts at Garden City, as host and chairman.

At the business meeting a vote was taken on the question, "Shall the industrial-arts teachers meet as a special group or join related bodies?" It was voted to stay as an industrial-arts group.

The speakers included James C. Boudreau, director, School of Fine and Applied Arts, Pratt Institute, Brooklyn, who spoke on "Three Dimensional Designs," and an address on "Aluminum and its use in Industrial-Arts Shops" by Douglas B. Hobbs, educational director, Aluminum Company of America.

Herbert L. Gregory, supervisor of industrial arts at Great Neck was elected chairman for 1941, with Kenneth C. Darling of Valley Stream serving as vice-chairman.

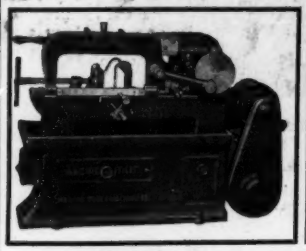
♦ The Thirteenth Annual Session of the Nova Scotia Mechanic Science and Industrial-Arts Teachers Association was held at Amherst, Nova Scotia, on September 27 and 28. The sessions this year were among the most successful meetings ever held by the association.

(Continued on page 28A)

RACINE

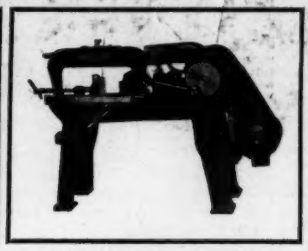
METAL CUTTING MACHINES

These moderately priced saws are designed to handle your school shop cutting in the most efficient and safe manner. Hydraulic. Available in two types — the Wet Cut Model and the Dry Cut Model — 6"x6" capacity.



W-3B "RACINE" Wet Cut Utility Saw

The New "RACINE" Wet Cut Utility saw — A general purpose, high speed, accurate machine. Hydraulic feed — 6"x6" capacity — Smooth quiet performance. A remarkable machine at a very moderate price.



The "RACINE" Dry Cut model of the Utility Saw. Hydraulic feed and control gives infinite range of pressures — Accommodates all classes of materials. 6"x6" Capacity. Rugged, durable construction.

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Racine Heavy Duty Hydraulic Saws 10"x10" to 14"x20"; Racine "Shear Cut" Screw Feed Saws 6" and 6" by 9"; Racine Hydraulic "Oil Cut" 6"x6"; and Racine Duplex Bandsaws. WRITE FOR FREE CATALOG 70B

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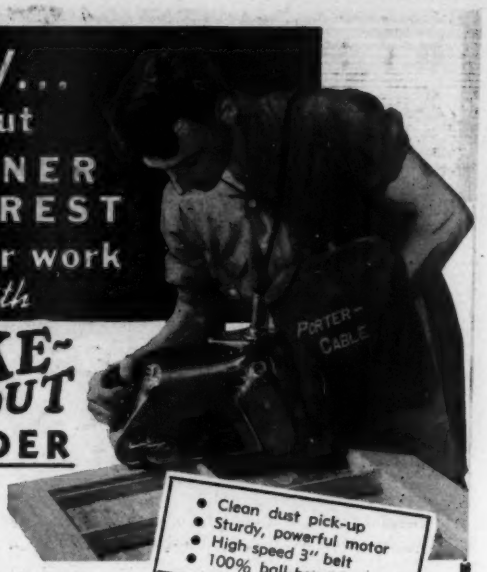
NOW... Put KEENER INTEREST in their work with

TAKE-ABOUT SANDER



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Add a keener interest . . . a still greater value to shop instruction . . . with this Dustless Take-About Sander. Teaches *expert* sanding — with new *speed*. A popular tool with either boy or adult classes. Here's a modern, easy-to-use, faster-cutting sander that helps you produce trained craftsmen for industry's fast-growing needs. Check the practical performance of this Take-About Sander yourself. Ask for a demonstration today by your Porter-Cable man (see phone book). No obligation!

Saves its cost in school maintenance alone. 101 uses for repairs about the school.

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PORTER-CABLE MACHINE CO. 1702-12 No. Salina St. Syracuse, N. Y.

(Continued from page 27A)

At the Saturday morning session, E. K. Ford, inspector of mechanic science for the province, urged the organization of courses of this study so that it may be introduced as soon as possible in grade XI.

President George Sutherland of Amherst, and secretary-treasurer, Charles L. Wood, the latter having served the association for 13 years, were complimented for the fine work they have done.

W. G. Tibert, director of vocational education of the Province of New Brunswick, expressed his gratification at a joint meeting of the New Brunswick and Nova Scotia Shop Teachers.

Lockhart Ferguson of Brigewater, and U. K. Hamilton of New Waterford, then gave an interesting report on the various study clubs conducted by industrial-arts teachers.

At the Saturday noon banquet, both Mr. Sutherland and E. K. Ford were lauded by Major M. J. Kaufman. The guest speaker, N. S. Sanford, Editor of the Daily News, spoke on the topic "The Canada of the Future."

The following new officers were elected: honorary president, E. K. Ford, Halifax; vice-pres., N. C. Houseman, Sydney; secy.-treas., C. L. Wood, Windsor; and additional member on executive, Lockhart Ferguson, Bridgetown.

The name Nova Scotia Mechanic Science and Industrial-Arts Teachers Association was changed to the Nova Scotia Industrial-Arts Teachers Association.

The 1941 session will be held in Truro on September 26.

♦ The Milwaukee Industrial Arts Teachers Association held their annual meeting on Saturday evening, Oct. 19. The following officers were elected for the ensuing year: Marcus Fugina, president; Edward Rang, vice-president; John Dunlop, secretary-treasurer; and Otto Braun, committeeman-at-large.

Otto H. Braun, member of the mechanical-drawing committee, reported on the progress of this committee. R. A. Radtke, supervisor of industrial arts, spoke on "Recent Changes in Mechanical Drawing Standards." After the business meeting the members retired for social relaxation and lunch.

♦ At the organization meeting of the Washington, D. C., Industrial-Arts Teachers Club the following officers were elected: L. L. Wood, pres., MacFarland Junior High School; E. R. C. Hartley, vice-pres., MacFarland Junior High School; H. M. House, secy., Hine Junior High School; Harold H. Kirk, treas., Langley Junior High School; Harold G. Crankshaw, recording secy., Central High School; J. Howard Waddell, Calvin Coolidge High School, and P. D. Weeks, Langley Junior High School, board of governors. The membership in this selective group is limited to 40 members.

♦ The Fourth Annual Southern Conference on Audio-Visual Education will meet at the Biltmore Hotel, Atlanta, Ga., on November 14, 15, and 16. Recent developments in the use of teaching aids such as sound and silent educational motion pictures, radio, recordings, lantern slides, filmstrips, and exhibits, will be discussed.

Copies of the complete programs and any other information concerning the Southern Conference on Audio-Visual Education will be gladly furnished. Address: 223 Walton St., N.W., Atlanta, Ga.

♦ On October 4 the Westchester Industrial Arts Club held its first meeting of the tenth anniversary year as guest of Richard Stotler, director of industrial arts at the Croton-on-Hudson High School, Croton-on-Hudson, N. Y. After a brief inspection of the high school shop, the members were conducted on a tour of the recently completed Pierre Van Cortland elementary school which contains a spacious, well-equipped shop. Later an interesting and informative talk was given by Dr. Lawrence F. Ashley, Chief of Vocational Education, Yonkers, N. Y., which outlined the aims, organization, and effectiveness of the defense school which is in operation at the Saunders Trade School each day between the hours of 8:00 p.m. and 4:30 a.m. A short business session brought the meeting to a close.

—Herbert F. Lidstrom

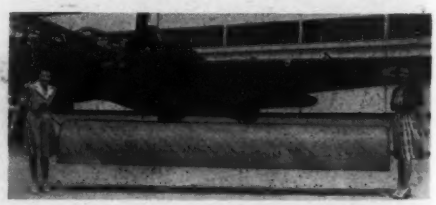
SUMMER SCHOOL NOTES

♦ The enrollment for the 1940 Summer School Session at the Bradley Polytechnic Institute, Peoria, Ill., showed an increase of about 10 per cent over the preceding year. This makes the eighth consecutive year that there has been an increase in the total attendance.

The larger increase must be ascribed to the evening session, the engineering group, and the industrial-arts group. In addition to the regular college program, five courses are offered for the men in the National Defense Program for which purpose five instructors from industry have been added.

WHO SAYS WOOD IS OUT?

The Glenn L. Martin Co., of Baltimore, are making their bomb-bay doors of a special kind of plywood strengthened with a light plastic material. The illustration shows a section 14 ft. long, weighing but 41 pounds, but stressed to bear more than 3000 pounds of weight. Reid B. Gray, chief of the Martin laboratories, Robert L. Hildebrandt, and George W. DeBell developed the door. The bomb-bay doors are part of the underside contour of the airplane and are thrown open by the bombardier just before he is ready to releave the lethal "eggs" over the objective.



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CLAYS
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Amaco ceramic materials and equipment are available for practically all types of pottery craft. For many years well known pottery workshops have used Amaco equipment because of ease and economy of operation and Amaco supplies because of uniform high quality. Each item in the line has been planned and manufactured to work perfectly in conjunction with all others to assure the user of best results.

Write Dept. B for Ceramic Catalog and Information Regarding Pottery Units Planned for Industrial Art Departments.

AMERICAN ART CLAY COMPANY
INDIANAPOLIS, INDIANA

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You can use this new low priced HAMILTON Table in your Mechanical Drawing or Art classes without strain on your budget. No. V-1645 Table, with 23 x 31" drawing surface, priced at only $7.50 in Eastern Territory. Write for price in your territory.
Soft, clear basswood top adjustable in slope. Positive height adjustment from 30½" to 40¼". Attractively finished hardwood base. Send in the coupon today.

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An ideal table model Continuous Blueprint Machine for student use.

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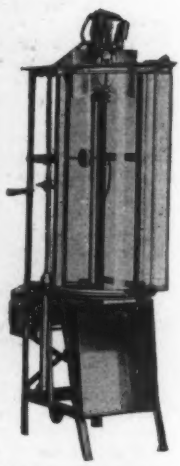
Your students will find more Pease Blue Printing Equipment in industrial use than any other make. Instruct with the same modern quality machines. A wide line is priced to fit your budget and every requirement.

In the lowest price range is the Pease Junior Vertical . . . an excellent training machine of wide versatility.

For prints up to 42" in width, we recommend Pease Model "3" shown above. It is compact, rapid, simple in operation, low in first cost, produces prints at a low cost per square foot, and is attractively modern in design.

Write for details regarding blue print equipment, blue print paper, drafting room furniture, or photographic arc lamps. No obligation, of course.



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Blueprinting Machine —an excellent Printer at rock bottom price.

Train on the most widely used line of Blueprinting Equipment. Pease makes the line you will want to use in the future.

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SHOP EQUIPMENT NEWS
New Products—Publications

SKILSAW ANNOUNCES NEW COMPACT BELT SANDER

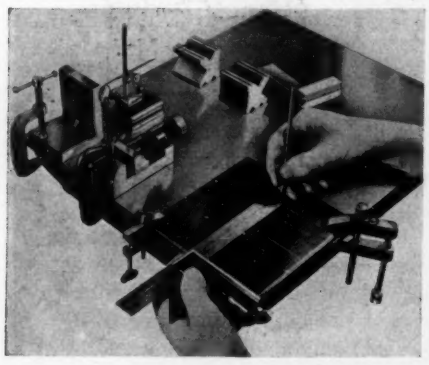
A lightweight 2¼-in. belt sander called "Zephyrplane Junior" has recently been introduced by Skilsaw, Inc., 5035-A Elston Ave., Chicago, Ill. "Zephyrplane Junior," being small and compact, is a highly efficient machine for homecraftsmen, for boatowners and in industrial-art classrooms. It is a time- and money saver in lumberyards when used for "cleanup" work on sash and doors and also in cabinet shops where it is used on many "final finish" operations.

This sander possesses the following "big-tool" features: a die-cast aluminum frame for lightness and strength, ball-bearing construction and a powerful sturdy universal motor, a bakelite handle for cool comfort, a safe trigger-type momentary switch and a patented "touch-control" lever which permits quick changing of belts. The belt travels at a speed of 600 f.p.m., is kept uniformly taut by a coil spring and can be easily centered by a simple adjustment. A variety of belts are obtainable adapting the tool perfectly for use on wood or metal, or for removing varnish and for polishing.

"Zephyrplane Junior" weighs only 9½ lb.

NEW LOW COST SURFACE PLATES

The Delta Manufacturing Company of Milwaukee has announced two new surface plates, measuring 15 by 8 by 3 in. and 16 by 22 by 3 in. that give the user everything he needs at a fraction of the cost of hand-scraped precision plates.



These new surface plates provide a true surface to start with. They are of massive design and properly ribbed to insure the surface remaining true. There are ledges at the edges of the plate for clamping purposes, and edges that are square with each other and square with the face. In addition, these plates may be made into precision plates by simply scraping to a master plate or to each other. The illustration shows how angle plates, vises, etc., may be clamped to this Delta Surface Plate and how convenient the squared edges are for laying out work clamped to the plate.

RALPO PENCIL POINTER

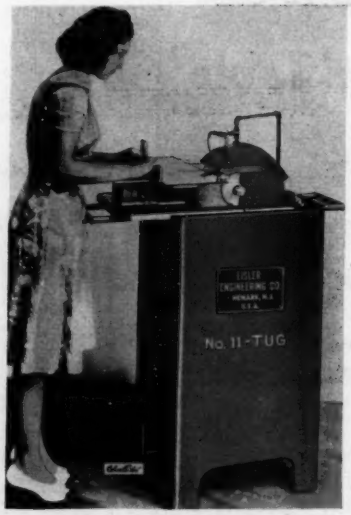
The Ralpo Products, Ralph W. Poe, Canton, Ill., announce a new pencil pointer made of strips of abrasive paper held in a V-shaped trough which is at the top of this unit and a small piece of fabric is at the other end.

Trough and fabric are secured removably in a base measuring 5 in. in length and 1⅜ in. in width.

As the pencil becomes dull, it is drawn lightly through the trough and either rotated or held to obtain the desired point. The fabric serves to clean the point after it has been drawn through the trough to remove loose particles of lead.

GENERAL GLASS CUTTER NO. 11-TUG

The Eisler Engineering Co., of 740-770 So. 13th St., Newark, N. J., has recently developed their general glass-plate cutter No. 11-tug for cutting glass tubes, solid glass bars, mirrors, optical glasses, nonshatterable glass, as well as ceramics, slate, porcelains, tiles, metals, etc. The machine is on a fabricated case which conceals the ½-h.p.



driving motor and centrifugal pump for the cooling water. The work is brought to the wheel by the cutting table and carriage which rests on eight rollers and is moved forward or backward by the extension on the cutting table. The cooling water is sprayed on the cutting wheel from many angles. A 12-in. cutting wheel mounted on a ball-bearing shaft is well covered to confine the water and also as a safety measure. The speed of the wheel is 1720 r.p.m. The back support can be set for cutting at any desired angle and an adjustable stop can be set to any length for cutting.

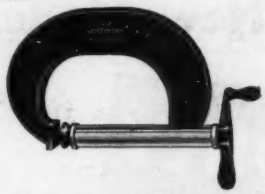
The elevated cutting table makes it possible to cut glass 12 in. long in one operation, and by working the table backward and forward, a large range of glass may be cut. When a lower table is used, glass can be cut to a depth of 3½ in., also a larger wheel guard must be used. No experience is required to perform delicate glass-work. This machine will also accommodate a 14-in. cutting wheel.

BODY AND WELDERS CLAMPS

For clamping service with "C" clamps beyond the strength and reach of ordinary malleable clamps, "Jorgensen" body clamps have just been introduced to the trade. The term "body clamps" refers to the most common use of these clamps in the assembling of wood or metal bodies in automotive and airplane construction. Welders also have found this clamp of surprising strength. They are not affected by repeated heating and cooling. While made of malleable iron, the gen-

erous use of metal, pattern design, and foundry practice have been combined to give them strength approximating and even exceeding in some instances that of the regular light-service, drop-forged steel clamps with very little increase in weight. A small groove across the foot of the frame provides a secure hold on corners or round sections without interfering at all with the ordinary grips on flatwork. The screws are made of cold-drawn steel. Wing-nut handles are regularly supplied as illustrated, but they can also be supplied with loose bar handles and plain riveted swivels. They are ready now in sizes 2 to 8 in. opening capacity, and are made by the Adjustable Clamp Co., 424 N. Ashland Ave., Chicago, Ill.

Another innovation are the "Jorgensen" welders clamps, with shielded screw which are now available in several sizes. Wherever welding is being done, this type of clamp provides the necessary strength, ruggedness, and protection against the usual and accidental hazards of such service beyond the limits heretofore attained in clamp construction.



The style illustrated has greater than the ordinary depth of throat, and they are able to stand heating and cooling without losing strength. The shield, which carries no part of the clamping load, protects the screw from being overheated, prevents spatter from reaching the threads, and keeps the screw from accidental contact with the welding torch or rod. The clamps may be had without the shield if this is not wanted.

The screw is 13/16 in. in diameter, made of cold-rolled steel with very coarse, deeply cut threads. A well-secured swivel, with brass-thrust washers, insures a broad contact with the work without creeping or twisting, and long wear. A solid one-piece crank handle is recommended for speed and power in operation, but loose-pin handles may be had for work in close quarters.

These clamps also are made by Adjustable Clamp Co., 424 N. Ashland Ave., Chicago, Ill.

NEW COLD-SETTING PLASTIC GLUE

United States Plywood Corp. is now manufacturing and distributing the first cold-setting resin adhesive ever produced in the U. S. A. Called Weldwood Plastic Resin Waterproof Glue, the product is bacteria-proof, rotproof, stain free, economical, and enduring. It is made under Plaskon patents.

Weldwood glue is easy to mix in cold water and can be used immediately after mixing. It is the only one-part plastic glue ever developed. It

(Continued on page 33A)

New Enlarged Edition

Wood Finishing
Metal Finishing
Synthetic Varnishes
Bleached Finishes
Four-Hour Varnishes

Coloring, Finishing and Painting Wood,

By A.C. Newell

In the new enlarged edition of this practical and comprehensive book on finishing, synthetic resin finishes, quick drying finishes, and the blond and bleached finishes so popular at present, are thoroughly treated. All facts of interest are presented for every wood finisher — industrial arts student, teacher, apprentice, or home craft worker. Each step in woodfinishing is completely and carefully explained—preparation of the surface, filling the wood, staining, shellacing, and enameling are all presented. A wealth of related scientific information is presented. Included is the development of coal tar dyes and colors, modern stains, new methods of coloring, types of varnish, tung oil finishes, ester gums, nitrocellulose lacquers, brushing and spraying lacquers, new pigments, extenders, drying oils, and thinners. The characteristics, use and effects of each of the above is carefully explained. The book presents just the information each teacher needs to help the students get good results.

480 Pages Enlarged Edition Price $4.50

The Manual Arts Press Peoria, Illinois

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"Jorgensen" CLAMPS
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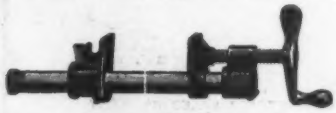
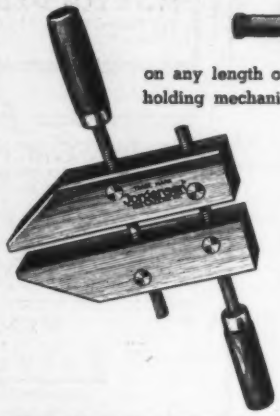
Style 70 Steel "I" - Bar

The stiffness of I-beam construction with the rapidity and security of the famous Multiple Disc Clutch holding mechanism.

Style 50 "PONY" Clamp Fixtures





on any length of ¾" pipe, with the "multiple Disc Clutch" holding mechanism, for speed, surety and simplicity.

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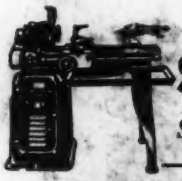

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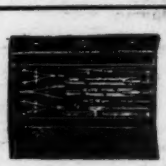

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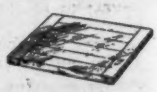

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(Continued from page 30A)

requires no separate hardener to cause it to set; nor need heat be applied at any stage in its application. The glue is ready for use immediately after mixing.

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Copy of a new handbook covering every phase of Weldwood glue and its uses may be obtained from Weldwood Division, United States Plywood Corp., 616 West 46th Street, New York City.

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The Frederick Post Co., P.O. Box 803, Chicago, Ill., announces a unique negative medium that assures identical duplications, line for line, called Post No. 226 Philm. It is tough, durable, and will take routine handling in making reproductions and other forms of duplication better than any negative paper on the market. Its waterproof treatment keeps negatives true to scale by preventing shrinkage or expansion. A glossy backing resists dust and dirt.

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NEW HAMILTON DRAWING TABLE

The Hamilton Mfg. Co., Two Rivers, Wis., has just put out a new drawing table which, though built to high quality standards, is low in price. It is an ideal table for the art studio, the sign shop, or the study room.

It is sturdily built of hardwood and attractively finished. The drawing board can be rigidly set at any angle from horizontal to 86 deg. The height can be adjusted from 30½ in. for the sitting position to 40¼ for a standing position or for use with a stool. The base is 20 in. from front to back and 28 in. from side to side.

NEW DESCRIPTIVE CIRCULARS

The American Type Founders, 200 Elmora Ave., Elizabeth, N. J., have just issued a number of circulars descriptive of a new line of cabinets which they have developed. This new equipment was specially designed to meet the needs of different sizes and types of schools.

Among the items described are: wood and steel type cabinets of various sizes and descriptions, marble and steel-top imposing tables, drying racks and stock tables, pressroom cabinets, paper-storage cabinets, 6 and 8-ft. make-up tables, and hand bookbinding equipment and bookbinder's workbench.

They also have a leaflet describing general-shop printing units for small community schools, accommodating from 4 to 6 pupils and varying in price from $85 to $185, depending upon the type of press used.

Another leaflet describes the printing units for small high schools, accommodating 4 to 8 pupils, with a larger selection of furniture, miscellaneous equipment, type and spacing material, and a wider choice of presses, varying from the 6½ by 10 in. chase size Pilot lever press, to the new series 8 by 12 in. C. and P. platen press. Some of these outfits also include a 12½ by 16 in. Vandercook proof press, and a hand lever paper cutter, or even a style A. Boston staple binder.

Prices for these outfits vary from $350 to $1465.

These circulars are all obtainable by writing to the firm.

"SANDPAPER — ITS HOW AND WHY"

The Behr-Manning Corp., Troy, N. Y., recently published a booklet entitled, "Sandpaper — Its How and Why." While this is not exactly a new piece of literature being a successor to their former booklet, "Abrasive Papers and Cloths," however, the cover has been redesigned, the illustrations have been brought up to date, and the copy has been revised throughout. This revised edition constitutes a worth-while piece of educational literature, full of valuable information not only for the students of industrial arts, but also for the experienced user of coated abrasives.

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(Continued on page 35A)

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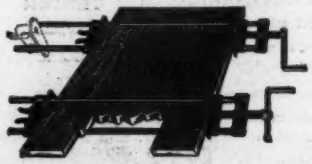

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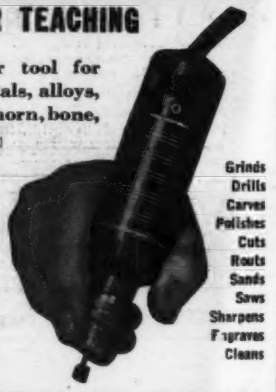

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(Continued from page 33A)

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The year 1940 means 60 years of success for Chas. M. Higgins and Co., Inc., which is celebrating its anniversary this fall. It was in 1880 that the late Mr. Chas. M. Higgins first offered for sale a black drawing ink which would take the place of the drawing ink then used, and which was made by laboriously rubbing an India or China ink stick in the water-filled well of a slate slab.

Born in County Leitrim, Ireland, in 1856, Mr. Higgins came to America at the age of six with his parents. As a young man he was employed for a short time by the paint house of F. W. Devoe and Co., later identified as Devoe and Raynolds. Always of an inventive mind, he secured a U. S. Patent on a leather screw pegging machine when he was but 19 years old. He later became a draftsman, largely self-taught, and worked with S. H. Wales and Son, patent solicitors and publishers of the Scientific News.

Finally he opened his own patent soliciting business in New York City. In the evenings and at other spare moments he conducted constant experiments in inkmaking, mostly in his sister's kitchen. It was here that he produced both the waterproof variety of Higgins American India Ink and a black writing ink known as Higgins Eternal Ink.

In 1885 a copartnership between Mr. Higgins and his brother-in-law, John Gianella, Sr., was formed to conduct the ink manufacturing business under the firm name of Chas. M. Higgins and Co., and in 1888 the patent soliciting business was sold, so that Mr. Higgins' entire time could be devoted to the development of the ink business. About this time the young firm built and put into operation its first factory in Brooklyn.

During the years 1890 and 1900 he obtained 21 patents relating to the manufacture of inks and adhesives.

Active as Mr. Higgins was in his business, he nevertheless found time to do much altruistic civic work. He died at the age of 75 in 1929.

The Higgins products, however, are still manufactured under the old firm name by Mrs. Higgins and the descendants of the original partners of the firm.

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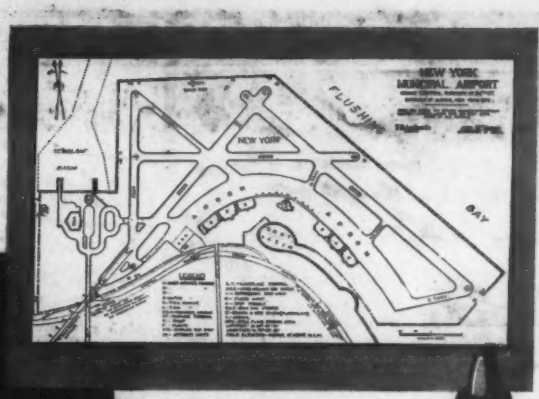

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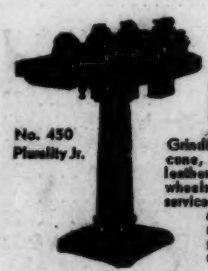

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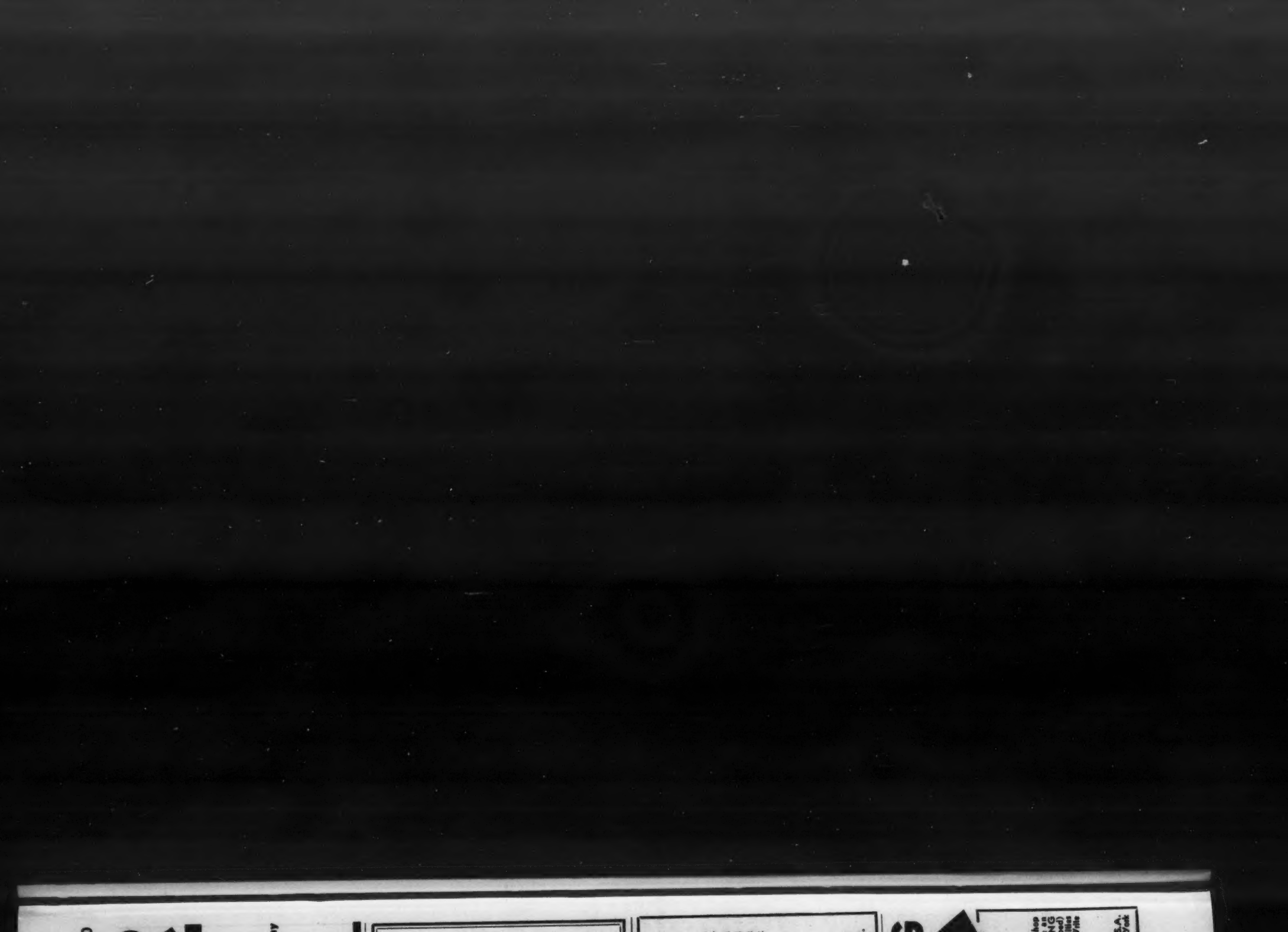
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